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ABSTRACT

Five papers from the 1990 CAUSE conference's Track III, Organization and Personnel are presented. The papers share ways in which professionals are preparing organizationally for the challenges and opportunities of managing information technology in the future, including such subjects as the kinds and availability of human resources that are needed, appropriate training levels and means, changes in styles of organizations. Papers and their authors are as follows: "The CIO in Higher Education and Health Care" (Marion J. Ball and Judith V. Douglas); "Desktop Power: Issues and Opportunities" (Therese A. Nelson and James H. Porter); "Super Productivity, Super Savings: Achieving the Potential of Integrated Administrative Computing" (Nicholas W. Andrews); "Effectively Merging Administrative and Academic Computing: Indiana University's Experience" (Polley Ann McClure, Barry M. Rubin, Susan Stager, and R. Gerald Pugh); and "Developing a Circle of Services for Microcomputer End Users: A Cost Effective Approach" (Duane E. Whitmire). (GLR)


# Challenges and Opportunities of Information Technology in the 90s

*Proceedings of the 1990 CAUSE National Conference*

## TRACK III

## ORGANIZATION AND PERSONNEL

November 27 - 30, 1990
Fontainebleau Hilton Resort and Spa
Miami Beach, Florida

CAUSE 90
MIAMI BEACH
NOVEMBER 27-30, 1990

# TRACK III

## ORGANIZATION AND PERSONNEL

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Papers in this track share ways in which professionals are preparing organizationally for the challenges and opportunities of managing information technology in the future—including such subjects as the kinds and availability of human resources we will need, appropriate training levels and means, changes in styles of organizations.

# CAUSE '90

## The CIO in Higher Education and Health Care

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**Abstract**

Surveys shed light on a still hotly debated topic: The Chief Information Officer in Higher Education (Penrod, Dolence, and Douglas, CAUSE, 1990) and Health Care Chief Information Officer (Heidrick and Struggles, American Hospital Association, 1990). Both surveys provide hard data on such areas as title, report structure and responsibilities, personal characteristics and attributes, and issues. The presentation considers implications of these data along with some of the notable soft findings. The session attempts to validate the CIO concept and to identify trends in information technology management.

# The CIO in Higher Education and Health Care

*The concept of CIO may be one of the most talked-about yet least communicative ideas since facilities managment, and any contribution to explaining it, and putting it into an appropriate context, has got to be much appreciated. -- Linda Fleit,* ***Edutech Report***

## *The CIO Concept*

As Fleit suggests, the concept of the chief information officer still requires clarification. This is not surprising, given that the first traceable mentions of the CIO date no further back than 1980 and 1981 to the work of William Synnott. Yet we cannot ignore the fact that, although the concept is debated and at times debunked, it is not ignored. Literature published during the 1980s (376 citations in five electronic databases) consists more of opinion pieces than evaluative studies. Equally significant, over one third of those citations date to the single year of 1988. Only two, or six percent, occurred before 1985. The concept, then, is relatively new, with the first occurrence credited to William R. Synnott in a 1980 *Computerworld* article and in the following year to the book coauthored with Gruber, *Information Resource Management: Opportunities and Strategies for the 1980s* (New York: John Wiley & Sons, 1981).

## The Surveys

From Synnott on, the literature has consistently implied linkages between the CIO concept and the information resources management (IRM) approach. Surveys of CIOs suggest the controversy surrounding the concept, however, if by no other way than by the types of data they choose to collect, such as data on title, reporting structures, and responsibilities for strategic planning and policy. Insights regarding these and other issues can be gained from two surveys completed in 1989 and published in 1990.

The first of these is *The Chief Information Officer in Higher Education* (CAUSE Professional Paper Series #4, 1990). In this paper, Penrod, Dolence, and Douglas provide an overview of the CIO concept in business, higher education, and health care. They conclude that hard data are generally lacking and proceed to report on their own survey of CIOs in higher education. The second of the 1989 surveys discussed here is *Health Care Chief Information Officer* (Healthcare Information and Management Systems Society of the American Hospital Association, 1990), an update to the 1987 survey published in 1988 and included in the Penrod literature review. (For an extensive bibliography on the CIO literature through 1989 and the first few months in 1990, consult the Penrod document.) Both surveys take on special interest, given the continuing visibility of the CIO concept in 1990.

At the November 1990 Symposium for Computer Applications in Medical Care (SCAMC), a panel entitled "Beyond the CIO: A New Organizational View" and chaired by a professional recruiting consultant, included members from the Johns Hopkins Health

System, Abbott Northwestern, and the Evangelical Hospital Association. In the book *Healthcare Information Management Systems: A Practical Guide* (Springer-Verlag, 1990), the index includes 22 citations for chief information officer (CIO), 16 for information management systems (with three cross references), and only eight for hospital information system (HIS); no other term is so extensively referenced. The October 1990 issue of *Manage IT* reports on seven CIO searches at the University of California/Davis, University of Pennsylvania, University of Minnesota, University of Tennessee, and three campuses of the University of Wisconsin (Eau Clair, Stout, and Madison). Certainly it would appear that any announcements of the death of the CIO concept in higher education were premature!

The higher education survey, directed by James Penrod, includes responses from 58 CIOs out of a pool of 139 identified (42 percent). Data were analyzed by Analystical Studies staff at California State University, Los Angeles. The health care survey, conducted by Heidrick and Struggles, the Healthcare Information and Management Systems Society (HIMSS) of the American Hospital Association, the Center for Healthcare Information Management (CHIM), and Andersen Consulting, reports on 137 participants out of a sample of 265 individuals (51.7 percent) responsible for the information management function of health care organizations.

Commonalities between health care and higher education are suggested by the finding that 80 percent of the responding CIOs in the HIMSS survey are employed by not-for-profit organizations (interestingly, the 1987 survey showed only 71 percent in this category). As will be documented below, the findings for these not-for-profit organizations appear to show marked differences from data on the latest Coopers & Lybrand/DATAMATION survey of over 400 of the nation's top 1000 companies reported by Carlyle in a rather negative and chiding article entitled "The Out of Touch CIO" (*DATAMATION*, 15 August 1990). Further evidence of commonalities is the mention of salary data for CIOs at university affiliated teaching institutions in the HIMSS survey. As the Penrod review of earlier surveys pointed out, the raw data are not available for analysis, and this group of CIOs remains hidden in the HIMSS summary. However, the nature of the descriptive data implies the trends and issues regarding the CIO concept. Below, the two surveys published in 1990 are summarized.

## Findings

**Composite Profiles.** The typical CIO in both sectors is a white male in his forties.

| | Health Care | Higher Education |
|---|---|---|
| Mean Age | 43 years | 46 years |
| Gender | Male (89.7%) | Male (93.1%) |
| Ethnic Background | "All White"* | Caucasian |
| Education | Masters 57.5% | Masters 79.3% |
| | Doctorate 0% | Doctorate 62.1% |

* Data from 1987 HIMSS study; not available in 1989

**Title, Organization, and Tenure.** Many of the opinion pieces published in the last decade focused on the use, or non-use, of the CIO title. Penrod states in the literature review that the CIO "function... is here to stay, no matter what we call it." Nonetheless, titles are a reasonably reliable indicator of organizational status.

| | Health Care | Higher Education | |
|---|---|---|---|
| Vice President/Sr VP | 32.6% | Vice President/Chancellor | 34.5% |
| CIO and Other Title | 20.0% | Assoc/Asst VP/VC | 25.8% |
| CIO | 12.6% | Vice/Assoc/Asst Provost | 10.3% |
| Director | 23.0% | Director | 23.0% |
| Other | 11.8% | No response | 12.1% |

In addition, the HIMSS survey shows a remarkable increase in the use of the CIO title in the two years since their first survey. At that time, only 6.9 percent or the respondents reported having the CIO title.

The survey findings suggest that CIOs tend to be located in relatively complex or large instititutions. A CIO in higher education is most likely to be working at a research university (51.7 percent) or a comprehensive institution (32.8 percent), and a health care CIO is most likely on the staff of a hospital with 500 to 999 beds (35.8 percent) ot more than 999 beds (17.2 percent).

Tenure in CIO positions appears to be short. Two thirds (66.9 percent) of the health care positions have existed for less than five years. In higher education, almost a half (46.6 percent) of the respondents reported that they have held their positions for less than three years.

**Reporting Structure and Responsibilities.** Reporting structures vary in both health care and higher education.

Position to Which the CIO Reports

| | Health Care | Higher Education | |
|---|---|---|---|
| Chief Executive Officer | 32.1% | President/Chancellor | 39.7% |
| Chief Operating Officer | 34.3% | Executive/Other VP | 36.2% |
| Chief Financial Officer | 25.5% | Provost/Academic VP | 19.0% |
| Sr VP Ops/Adm | 8.1% | Other | 5.2% |

It should be noted, however, that the HIMSS study showed a full 82.1 percent of the respondents felt that they *should* report to the CEO. This is particularly wise, given the cross tabulations of responses in the Penrod study which reveal that CIOs who report to the president are in a number of respects better situated than those who do not and differ from them in a number of ways. Higher education CIOs who report to the president are more likely to approve institutionwide information technology purchases, to have more administrative and technical staffs, and to be executive officers. They are also more likely to be what

Penrod identifies as information resources management type organizations (basic organizational units plus others) and to hold academic rank.

| | Health Care | Higher Education |
|---|---|---|
| Executive Officer | 50.7% | 58.6% |
| Regularly Attend Board Meetings | 54.5% | 48.3% |

In presenting the findings on higher education, Penrod concludes that "Organizational units headed by responding CIOs appear to be idiosyncratic to the personalities, politics, and histories of individual institutions." His data and that gathered for the HIMSS survey bear out that conclusion.

**Areas Supervised**

| *Health Care* | | *Higher Education* | |
|---|---|---|---|
| Information Systems | 98.5% | Data Communications | 96.6% |
| Telecommunications | 65.4% | Administrative Computing | 89.7% |
| Management Engineering | 30.9% | Academic Computing | 86.2% |
| Medical Records | 14.7% | Voice Communications | 69.0% |
| Admitting | 10.3% | Planning | 32.5% |
| Quality Assur/Util Rev | 7.4% | Television Services | 26.7% |
| Materials Management | 6.6% | Institutional Research | 19.0% |
| Departmental Info Serv | 6.6% | Printing | 17.2% |
| Ancillary Services | 5.1% | Mail Services | 17.2% |
| Marketing/Planning | 4.4% | Copying/Reprographic Service | 17.2% |
| Business Office | 3.7% | Media Services | 15.5% |
| Other | 3.7% | Library | 15.5% |

**Compensation.** As in earlier surveys, compensation data are difficult to compare, because they are constituted differently in different sectors and summarized differently from study to study. Penrod finds a median salary of $89,167, whereas HIMSS reports a mean salary of $77,570 with a mean cash bonus of $6,720 for 41.6 percent of the respondents and a wide assortment of perquisites for 75 percent of them. The end result makes compensation in the two sectors fairly comparable. In an interesting crossover between higher education and healthcare, HIMSS reports the highest "average" salary ($84,930) to be that of CIOs at university affiliated teaching institutions. Data in the HIMSS survey shows base salaries for CIOs to increase with the bedsize of their employing institutions. In higher education, salaries for CIOs were related to title, with vice presidents/chancellors paid at a higher level (median $103,571) than assistant/associate vice presidents/chancellors (median $95,000) and other titles (median $83,000).

**Budgets and Information Systems.** Mean departmental budgets in health care totaled $3.175M in 1989; again budget was directly related to institution size, with the health care CIO most likely to work in a 500-999 bed facility and to have a budget of $4M. In higher education, the typical CIO had an annual budget of $9.6M; 27.6 percent had budgets of $1M to $5M, 13.8 percent $5M to $10M, and 24.1 percent $10M to $20M.

## Other Findings

The descriptive data from the two surveys suggest the positions which CIOs now occupy within higher education and health care. They also clarify critical roles and functions which the CIO position addresses and offer a rebuttal to some of the criticism leveled against the position. Notably, respondents to both surveys reported a commitment to planning. In health care, 80.3 percent reported that a methodology had been implemented for the planning, acquisition, design, and installation of information systems, slightly fewer (78.4 percent) said that they had completed a "long range" plan in the last three years. In higher education, 67.2 percent indicated that their institution had a formal strategic plan for information resources, although fewer than half reported a strategic plan for the institution as a whole (43.1 percent) or a formal planning model (44.0 percent).

Significantly, planning was also ranked as the second most important function by the higher education CIOs and was perhaps suggested by the high rankings given "Leadership" and "Provide Vision."

**Higher Education**

| *"Most Important Functions"* | | *"Most Important Characteristics"* | |
|---|---|---|---|
| Leadership | 80.8% | Communication/Interpersonal Skills | 73.6% |
| Planning | 71.2% | Good General Management Skills | 60.4% |
| Communication/Liaison | 61.5% | Technical Competence/Knowledge | 52.8% |
| Provide Vision | 34.6% | Vision for Information Technology | 41.5% |
| Manage Information Systems Budget | 34.6% | | |

If these rankings are significant, they may also be implied by the category of attributes for success in the HIMSS survey. (According to Heidrick & Struggles, health care CIOs were curiously reluctant to credit vision for their own success: 79.4 percent of respondents deemed it necessary for other CIOs but only 28.9 percent credited it with contributing to their own success.)

Health Care

"Attributes for Success"

| | |
|---|---|
| Leadership | 83.1% |
| Vision/Imagination | 79.4% |
| Business Acumen | 49.3% |
| Knowledge of Hospital Systems | 44.1% |

**Strategic Issues.** Ratings of strategic issues for both sectors also demonstrate shared concerns. In the HIMSS survey, 86.6 percent of the respondents agreed that "CIOs should emphasis their strategic rather than their managerial role"; a smaller number (54.1 percent) agreed that "The most important role of the CIO is to integrate the functions of information systems, management engineering, and telecommunications." In higher education, respondents listed integration among the top strategic issues their institutions face.

| | |
|---|---|
| Networking, infrastructure linkages, connectivity, LANs | 51.7% |
| Integration of technology into curriculum, with each other, into mgt/admin | 48.2% |
| Resources for acquisition, operations, etc. (incl. standards to maximize investment) | 44.8% |
| Providing technology and training in support of instruction, research, etc. | 37.9% |

Regarding networking, it should be mentioned that one of the hottest issues now being discussed in health care is the development of Health Level 7, also known as HL7, which is the term for software which will allow true integration of multiple systems. Panels on this concept have drawn large crowds at conferences, as at the 1990 HIMSS meeting.

These responses, however they are interpreted, stand in opposition to the findings of the 1990 Coopers & Lybrand survey of business CIOs, who drew heavy fire from Carlyle in *DATAMATION* (15 August 1990) as "dangerously disconnected from the business side of the house, customers and the executive's own users." Those CIOs ranked issues on a scale of 1 to 10, with the following results:

Business CIOs
Impact of Issues

| | |
|---|---|
| #1 | IS credibility |
| #2 | Retraining, acquiring & keeping IS staff skills |
| #3 | Increased management expectations |
| #4 | Redefining technology, data & applications strategies and architectures |
| #7 | Establishing a strategic role for IS |
| #17 | Integrating & applying multimedia technologies |

## Implications

The findings of the health care and higher education surveys published in 1990 support the conclusion reached in the literature review included in *The Chief Information Officer in Higher Education*:

> There are major differences between CIOs and their roles in business, health care and higher education. Examples of these differences include salary structure, profit motivation versus non-profit enterprise, magnitude of budgets, and types of management applications....Such examples seem to be reflective of the basic differences between the enterprises rather than functions of the CIO position. (20-21)

The findings of both surveys underscore an additional point Penrod makes in his conclusion: evaluation is not mentioned in the literature or in responses to survey questions. Future studies might be constructed to yield some measures in this area. The repetition of the HIMSS survey, like the annual Coopers & Lybrand survey, provides insights on the evolution of the CIO position. An iterative study in higher education might do so as well. With both higher education and health care facing increased pressure to demonstrate effectiveness and return on investment, not only the creation of new CIO positions but also the continuation of existing ones may depend upon such evaluation.

Only with rigorous assessment will the profession be able to continue to evolve "both in numbers and in administrative acumen, to keep pace with the change, and consequent needs, wrought by the continuing revolution of information technology," as Penrod hopes. Such surveys provide much needed data. As the profession advances, both health care and higher education will benefit.

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# Desktop Power: Issues and Opportunities

**CAUSE 1990**

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*Abstract*: Universities can deliver desktop power to address needs across the whole spectrum of administration. We develop this thesis beginning with a brief description of two studies focusing on administrative needs recently conducted at the University of Chicago. We describe our approach, discuss our findings, and identify some of the roadblocks preventing the effective use of desktop power. Finally, we offer several problem-solving ideas you can use to increase the benefit of your computing investments through desktop computing.

# Introduction

At the University of Chicago, we recently conducted two studies focusing on administrative needs:

- An exploratory study of administrative computing needs and issues
- A study of academic computing, including academic administrators

We began the administrative study by developing a set of survey instruments to be used in interviewing the users of mainframe systems in central administrative departments, beginning with the Comptroller's Office. We attempted to gain a broad picture of administrative computing needs by asking users first what they did, then with what tools, rather than evaluating administrative computing in terms of reactions to individual existing systems.

The users within the Comptroller's Office pointed to specific important problems, many to do with reporting, analysis, training, difficulty of use, etc. in the mainframe systems. They also pointed out their need for various management tools. With specific exceptions, however, most noted that they were quite satisfied with their technical support staff and felt they could go to them for help in resolving system problems, and their needs would be addressed within resource constraints. In other words, although resources were regrettably scarce, most felt a source of help was available to them.

Interestingly, however, several of the users in the Comptroller's Office pointed us outward toward the divisions and departments, noting that this was where the real needs were, and advising us to talk with administrators throughout the University. Several interviewees in the Comptroller's Office were very vocal about the administrative problems on campus outside of their office and felt that more effort should be concentrated on those needs. We therefore left the Comptroller's Office and began interviewing administrators in other parts of the University.

In the course of the interviews with people both from other central departments and in academic divisions and departments, we found a high number of desktop computers, but widespread dissatisfaction and a number of needs which could have been met using the desktop computers, but were either not being met, or were being addressed inefficiently and redundantly. This led to our definition of the *desktop power opportunity*--that portion of administrative needs that could be met through carefully applied desktop solutions (discussed in more detail below).

As the study progressed, problems began to surface again and again which, though different in their specifics, could be categorized into larger, representative problems which we labeled "issues." The intensity, consistency, and quantity of the comments indicated we were dealing with more than ordinary complaining. We publicized the issues to our Administrative Computing Board (the highest ranking board for administrative computing on campus).

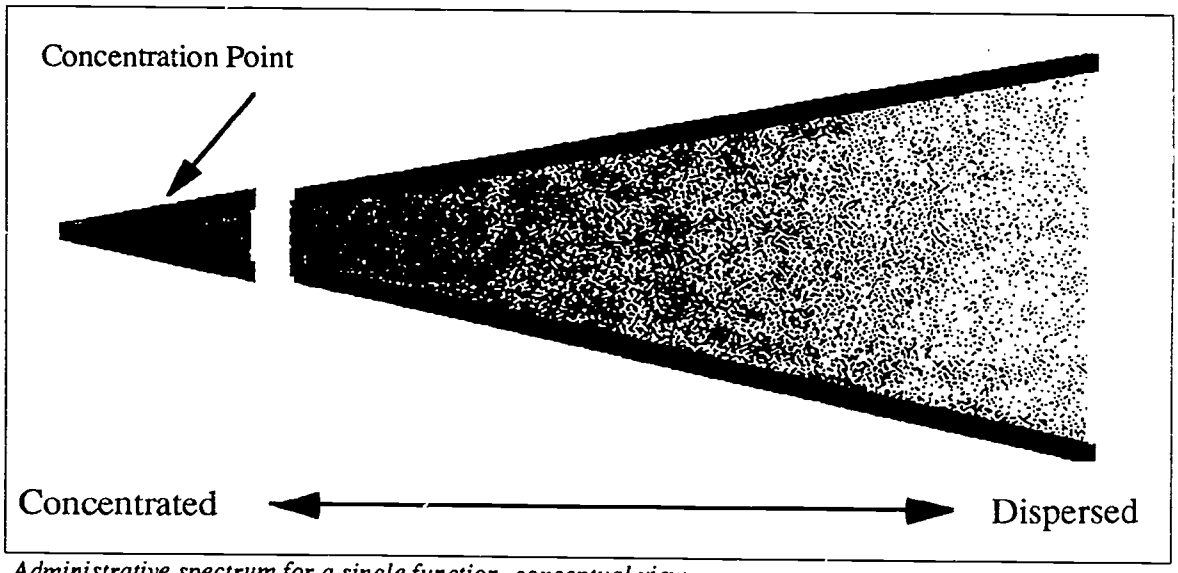
Some time later, we were involved in a study of academic computing needs, in which faculty themselves requested us to interview their academic administrators and to address the problems in academic administration. The administrators we interviewed brought up the same issues articulated in the administrative study, reinforcing our belief in their accuracy.

All-in-all (including seminars conducted after the initial studies) we interviewed over 100 people involved in administration. In both studies, administrators and academic personnel alike expressed their appreciation for the study and their fervent hope that it would have a positive impact on meeting their computing needs.

# The Spectrum of Administration

Administrators are responsible for managing the financial, organizational, and physical environments which support the University's primary missions of instruction and research. In this paper, we use the term *administrator* loosely to mean all those whose primary job is administration, which includes some heavily administrative academic personnel and all administrative agents (such as secretaries, administrative assistants, and fiscal assistants).

Often, we think of administration in terms of central administrative areas. For instance, when we think of purchasing we think of the Purchasing Department, payroll brings the Payroll Department to mind, and registration reminds us of the Registrar. During the course of our administrative study, however, it became clear that central administrative activities are only the tip of the administrative iceberg. For each functional area, a spectrum of activity, ranging from highly concentrated to widely dispersed, exists outside of the central office. A central office might, in fact, be considered an *administrative concentration point* on the spectrum for a particular function. Outside of the central office for the function, a host of vital, decision-intensive administrative activities related to the function are conducted at the University which tend to be hidden and distributed throughout campus, but nevertheless have a great impact, producing the majority of all data at the University. The medium of communication between the dispersed and central portions of administration is currently, for the most part, paper forms and reports.




*Administrative spectrum for a single function, conceptual view.*

The diagram above shows the administrative spectrum for a single function. Each central administrative office falls at the extreme left of the spectrum for its particular function and has University-wide responsibility for that particular administrative function. (For example, the Purchasing Department is the concentration point for the Purchasing function.) The spectrum for each function has a different shape. Some are wider and shorter, some longer, etc. Some have almost no dispersed portion, others have no clear concentration point.

*Dispersed* administration encompasses all the activity related to a specific functional area that takes place outside of the central office responsible for the function. In other words, all accounting activity at the University outside of the central accounting office, whether it takes place in a central department or not, is dispersed administration. It is important to understand

that people within central departments, when they are not working in their area of speciality, are every bit as much involved in dispersed administration as those in academic departments. For example, managers in the central accounting office spend the lion's share of their time on demanding accounting activities, but must still prepare budgets and hire and fire using the same tools as persons in what we traditionally regard as more dispersed administrative areas.

Dispersed administrative activities vary in complexity, scope, and duration, including tasks such as grants management, budget submission, financial reconciliation, and a host of other activities performed by administrators. Examples of persons performing dispersed administration are deans, directors, managers, principal investigators, administrative assistants, senior secretaries, and fiscal assistants. There are many gradations of activity within dispersed administration. Toward the left of a function's concentration spectrum, we find people who, though outside of the central concentration point, nevertheless spend a large portion of their time on activities related to that particular function. For instance an associate dean for management and budget within a large University division might work heavily with accounting activities, but is also concerned with activities related to other administrative functions. This person might also delegate accounting responsibilities to agents who then spend as much time on accounting as their counterparts in the central accounting office.

As we move to the right along a function's concentration spectrum, we find more and more people involved in the function, but generally spending a smaller percentage of time with it. Again to use accounting as an example, one finds highly dispersed activity performed by decision-makers such as deans, department heads, and academic administrators to whom accounting is critical, but only a small part of whose job involves dealing with accounting-related matters. Here, the accounting function is highly dispersed, both in terms of the number of people performing it and the fraction of each person's time spent on accounting activities.

Now let's complicate the picture by adding in another function--say, budget preparation, once again tracing the spectrum of activity within the function from highly concentrated to widely dispersed. The Budget Office is the concentration point for this administrative function. Budget Office workers spend 90% of their time on budget-related activities. But this time we find that the central accounting office manager, the same person who was part of the concentration point for the accounting function, is a dispersed administrator in the context of budget management, spending only a small fraction of his or her time on this activity. At many points along the budget spectrum, we encounter the same administrators as we did on the accounting spectrum.

Clearly, a large potential for multi-function complexity exists at the fringes of the administrative spectrum. A significant number of administrators, particularly those in isolated academic departments and in small or mid-size divisional offices, must deal with many small pieces of dispersed administrative activities. These persons' work is highly fragmented and interrupt driven. Their efficiency is hampered by the sheer diversity of tasks they must perform and by the number of their interfaces with central administrative concentration points.

In the course of the study, we interviewed many administrators involved in dispersed administration. Though we have not conducted a census, we estimate that there are between 300 and 400 administrators whose days are broken into tasks related to multiple administrative functions. Added to these are the hundreds of fiscal assistants, secretaries, and other clerical and support staff who work full time on dispersed activities. In addition, we noted that people who spend most of their time with a) academics or b) activities related to central administration (including analysts, accountants, lawyers, computer specialists, architects, etc.) also spend time on dispersed activities. For an illustration of the number of people involved in dispersed administration, note that more than 34,000 account ledger reports are sent to over 2000 account

administrators across the University every month. Each person who examines a ledger report is performing a dispersed administrative activity.

# Understanding Dispersed Administration

The primary product of the University is education and research. Efficient, effective administration is part of the climate fostering or hindering that research. Since administrators and faculty alike benefit from good administrative support and share some of the same information needs, solutions that enhance administration ultimately benefit the academic community (especially those members who perform formal dispersed administrative functions). As effective administrative systems are developed, administrative productivity will improve and academicians will be able to streamline their own administrative activities.

*Because of the sheer magnitude of dispersed administration, the University stands to gain the most leverage from addressing the highest priority needs across the whole spectrum of administration--both within central concentration points and within dispersed administration.* Therefore, one of the most pressing requirements at the University is to establish a mechanism for understanding and prioritizing the computing needs of the dispersed administrator along with those of administrators in central concentration points, where a (perhaps imperfect) means for prioritization already exists.

In order to understand the real needs of the University employee performing dispersed administrative activities, one must cease to see the world in terms of one administrative function or one system at a time and take a holistic view. One must see the world from the administrator's desk, often looking outward toward many concentration points at one time. Many dispersed administrators must deal with enormous multi-function complexity, as demonstrated by the number of paper forms generated in the course of routine activities. This complexity is not obvious when one approaches dispersed administration from the viewpoint of a particular concentration point.

Only by taking the dispersed administrator's viewpoint can we understand his or her real needs. As stated by one study participant: "We need people who understand that the central offices are not the pivot points around which the University revolves. The University's product is education and research and we should chart a clear course toward emphasizing those activities that benefit students and faculty the most."

The administrative study described here was, to our knowledge, the first attempt at the University to take a holistic view of the needs within the dispersed portion of University administration. Although we do not claim to fully understand the complex needs within dispersed administration, we discuss below some of the insights we gained over the course of the study.

# Dispersed Administrative Needs

In our exploration of dispersed administration, we identified a number of specific needs, which we have categorized below into three areas. Overall, we found in talking to administrators that they need help simply in doing a better job of administration. They view computerized tools as one of the means to that end, not a need in and of itself. Because the dispersed administrator's job is usually not tied to any of the mainframe systems that directly support central administrative concentration points, they do not think of needing better access to X, Y, or Z central system, although most are aware that these systems exist, and many even know their names. Dispersed administration includes the following broad categories of tasks (the amount

and kind of work in each category varies depending on the amount and complexity of the person's administrative responsibilities):

- Performing general administrative tasks
- Preparing and submitting data to concentration points
- Retrieving and analyzing data from concentration points

NOTE: Although this section focuses on dispersed administrative needs, many of the concerns discussed below also apply activities in administrative concentration points.

### *Performing General administrative tasks*

Dispersed administrators have responsibility for numerous general tasks such as mail merge, scheduling, correspondence, filing, and list management. Day after day, administrators at the University make things happen. A significant amount of administrator time is spent on general tasks; common sense desktop efficiency solutions are needed to make these tasks more efficient so administrators can concentrate as much as possible on high-payback management oriented activities.

### *Preparing and submitting data to concentration points*

Many dispersed administrative management activities (e.g., budget, hiring, academic appointment tracking) require administrators to deal with paper forms. Administrators need ways to 1) streamline the production of the paper forms (currently, nearly all forms must be typed), 2) reduce the amount of paper they must handle and 3) submit data to concentration points in an easier way. The need for help in this area increases exponentially as the number of administrative areas in which the administrator is involved rises. A great amount of time goes into this area of administrative activity, yet this potentially high-yield area is often overlooked.

### *Retrieving data from concentration points*

This need can be summed up in the phrase "the information I need when I need it in the way I need it." Administrators need electronic access to the data they submit to central concentration points at any point in the processing cycle, from the time of initial entry until final approval and disposition. In addition, they need to be able to integrate that information both across multiple functions (e.g.. across payroll, accounting, and budget) and across time (e.g., historical and variance comparisons) and to incorporate and present that information in the form of management reports.

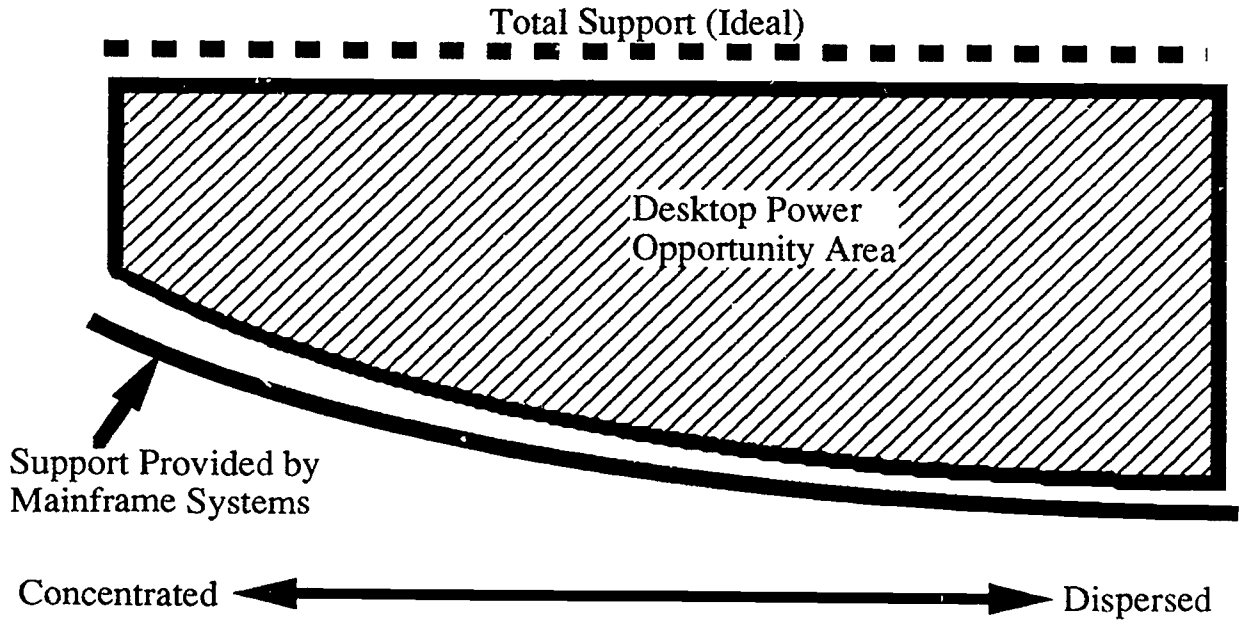
As a simple example, grant administrators need to be able to integrate payroll commitments into grants analyses. A divisional administrator might need to pull together information from the faculty system and the student system. A department head might need to integrate information from the accounting system into budgetary projections. Administrators, especially, who deal with many functional areas, need ways to meld together some of the dispersed functions where they fit logically into a whole.

## The Desktop Power Opportunity

In the past, the major task of administrative systems was to automate clerical functions. Central offices had the most visible concentration of clerical employees, and central departments were best positioned to sponsor and develop systems. In addition, computing technology was best able to support centralized operations. It was therefore natural that traditional central system development assumed that the requirements for a system intended to support a particular functional area, such as accounting, could be properly dominated by the

needs of the one central office responsible for the function. Although the focus of central systems efforts has started to broaden to dispersed administration, dispersed administrators are increasingly frustrated with the inabilities of systems designed with the concentration points of administrative functions foremost in mind to meet their needs.

The number of personal computers at the University has increased steadily over the last several years. Personal computers, linked where appropriate with solid mainframe systems, provide a great deal of CPU that the University can tap to meet those needs not now being met at the University (in both concentrated and dispersed areas). We have labeled this the *desktop power opportunity*.




## Roadblocks to Tapping Desktop Power

In the mid 1980s, administrators began to acquire personal computers, and by 1987-88 a critical mass of these machines began to exist at the University. But although many administrators are using their computers to advantage, needs remain unmet for many others. Why? During one interview, a director, unprompted, summarized a number of the problems we encountered: "These are the things that irritate me: Lack of policy and support. No money. No guidance, no direction as to the best and most efficient way of doing things. No support for management reporting. There is no one to help us tap the power of the mainframe and no one to give us help of any sort. Communication is very poor. We need management information tailored to what we need. As it is, we are completely on our own with micros."

As we explored administration from the viewpoint of the dispersed administrator, we encountered a number of specific roadblocks that are preventing administrators from using their desktop computers to become fully informed.

- Lack of training
- Lack of standards and guidance
- Lack of support
- Unavailable data
- Lack of appropriate tools
- A plethora of paper

NOTE: Financial shortages were mentioned frequently as a problem in administrative computing and many of the roadblocks could be overcome, in whole or in part, by increased resources. In this time of tight budgets, however, the funding of any administrative improvements must be carefully judged for cost effectiveness. We explore cost-justification and other issues in a later section entitled "Delivering Desktop Power."

### *Lack of Training*

Dispersed administrators' efforts are often hindered by an extremely rudimentary level of microcomputer knowledge. Administrators were repeatedly frustrated by the lack of microcomputer training available.

### *Lack of Standards and Guidance*

Few University-wide guidelines or standards exist for acquiring or using local computing resources such as hardware, networks, programs, technical support and consulting services. There is no absence of opinion, but an authorized source for standards does not exist.

As a result of the lack of standards, a huge diversity has developed in computer hardware and software. The results are costly: we encountered an example where a deputy director needing to share data carried not just a disk of information, but an entire PC bask to her desk, then spent 4 hours reformatting the information into her spreadsheet. We also see cases where administrators purchase new, outdated equipment (such as PCs without 286 chips).

### *Lack of Support*

The University does not provide sufficient technical support to allow the majority of administrators to take full advantage of the power in existing desktop computers. Administrator after administrator cited this lack as a major computing roadblock. One dean said: I wish there were a resource I could turn to and say: set me up! I don't want to have to be a computer expert. I have plenty of other work to do. I just wish someone could come along and do this computer stuff for me so that I could concentrate on my job.

### *Unavailable Data*

Some of the data needed by administrators in order to manage their areas of the University is currently non-existent in electronic form. Often this lack is a matter of timing (i.e., information is not captured at a timely point in the processing cycle). For example, purchasing requisitions now affect accounts only when they are actually entered into the mainframe computer. However, administrators monitoring purchasing (a dispersed administrative activity), need to see the effect of requisitions on their accounts in order to know how much they have spent and how much they have left, because to these users, once the request is signed, the money is spent. This need is especially acute for grants managers with approaching grant expiration dates.

At times dispersed administrators lack information that does reside in central mainframes, because they do not have access to it. Countless times administrators told us, "I need to know whether a bill had been paid." The answer to this simple question resides in the University mainframe. Currently, those administrators who do have access to mainframe data often do not use it or avoid it because it is difficult to use. This is particularly true of administrators who deal with multiple functions. The traditional view has been that people who really needed access would learn to cope with the difficulties of getting it. Current thinking, however,

suggests that it may be worthwhile to the University to ensure that available data is used even by those stymied by access problems. The University must, however, expend resources where the greatest payback exists, emphasizing access to strategic data expected to produce the greatest payback.

Another data availability problem is that, currently, the most productive software tools available to dispersed administrators sit on the desktop, but data, by and large, sits on the mainframe. This results in great inefficiencies as people attempt to bring the data back to their local machines through rekeying. A large number of those we interviewed expressed frustration with the lack of readily available management data. We saw cases where *managers* spent time rekeying data from paper account ledger reports. Graduate students and clerical personnel throughout the University are typing information that exists in mainframe systems into spreadsheets. While not always bad, this effort can be wasteful.

### *Lack of Appropriate Tools*

Many administrators cited a lack of appropriate tools for their work as a significant roadblock in their use of desktop power. Desktop resident (as opposed to mainframe) packages are preferred by administrators both because they are familiar and because they provide the flexibility to structure the local system environment to meet individual needs. Desktop tools are also easy to use and well-suited to dispersed administrative tasks.

Administrators have many of the raw tools they need, but little in the way of prepackaged solutions on which they can draw to maximize their efficiency. One could argue that all that is needed in this regard is proper training. Certainly this would help, but many administrators feel their jobs are complex enough without having to computerize their own tasks.

As we conducted this study, we observed great inefficiency as literally hundreds of administrators across the University independently invested time and resources in developing different solutions to essentially the same set of dispersed administrative needs. To illustrate: Approximately 30 quotes in our interview notes refer to administrators' independent implementations of accounting tools to analyze their monthly financial data.

The question remains: to what extent should the system needs within dispersed administration be addressed by a central investment of resources? We discuss further some concerns related to this topic in the section entitled, "Delivering Desktop Power."

### *A Plethora of Paper*

The volume of paper transferred around the University every month is a serious hindrance to increasing the speed and efficiency of dispersed administration. Not only must forms be physically filed, retrieved, tracked and distributed, they also require administrative offices to continue using typewriters rather than focusing in on the powerful tools in their computers. The University might be able to realize significant efficiencies by replacing high-volume paper forms with electronic communications.

## Delivering Desktop Power

At least three factors must be considered in decisions regarding possible approaches to delivering desktop power:

- Possible solution sets
- Infrastructure prerequisites
- Pragmatic requirements

## *Factor 1: Possible Solution Sets*

The possible solutions to the problems must be understood and examined. Three solution sets, each with the potential to occupy an entire paper, are summarized briefly below.

- Set A: Immediate, lower-cost activities that the University can engage in now to improve desktop computing include 1) ***targeted user training*** in currently available desktop computer packages, 2) *better communication and publication* (for instance, establishing a clearing-house for solutions; providing conduits, such as networking, newsletters, support groups, user groups, etc., to improve communications between administrators), 3) establishing *standards and guidelines* with effective site licensing (also an area of high concern to academic personnel), and 4) continuing to improve the *functionality* of and *dispersed access to mainframe systems*. Simple focused *support* of dispersed administrative computing will do much to meet administrator needs and to deliver desktop power.

- Set B: Many corporate and university mainframe applications, though old by computer standards, are nevertheless solid workhorses that excel in high speed, large quantity processing. Such systems have been called "legacy systems." Major corporations, as well as Universities, who have invested in legacy systems have difficulty in justifying their replacement, but distributed users are often less than impressed with the ability of legacy systems to handle their local needs. They are demanding better access to information housed on the mainframe, and want improved tools for analysis and manipulation of the data.

  A trend therefore exists toward *pragmatic data integration.* This term was coined by the Gartner Group to describe the grouping of diverse mainframe systems under a single front end that would appear to the user to integrate underlying mainframe systems, although consistent, fully integrated data storage might not be financially practical below. Participating desktop computers would be networked to take full advantage of electronic communication, turning diverse computing functions into large conceptual systems.

  Such a solution would allow the University to deliver desktop power through teaming up the mainframe and the local computer to take advantage of the capabilities of each. Bill Gates, of Microsoft Corporation, recently suggested the same in discussing the concept of "information at your fingertips." Simply put, the idea is that all the data typically needed in business should be instantly accessible from a desktop personal computer. "In the future, computer users will forget about their applications and think about their documents instead."* *Project Mandarin*, an integrated administrative workstation project at Cornell University, utilizes the same concept. The University of Maryland has also embarked on a venture designed to provide administrators with access to mainframe data.

- Set C: The University might take advantage of the possibilities offered by modern hardware and software technology to reengineer existing systems into new, more cooperative architectures, possibly pushing University computing onto a different cost/performance curve. For instance, one might implement a single database under a coherent set of administrative systems, necessitating real, rather than pragmatic, data integration. This solution set might involve the acquisition of UNIX workstations and the implementation of network-based distributed databases (again, perhaps teaming up local and mainframe power). Dispersed and central administrators both could take advantage of the tools in the

* Darryl Rubin, Microsoft software architect in charge of future office software.

new systems. Such an option, however, is costly and, with a limited potential for staff savings, can be difficult to cost-justify.

### *Factor 2: Infrastructure Prerequisites*

Many desktop solutions require a stable infrastructure consisting of components such as networking and solid mainframe systems. For example, an appropriate network, implemented with proper security and audit measures, might be used as a routing device for the data now routed on paper forms.

Networking, a powerful tool for communication, links concentrated and dispersed activities electronically, creating dynamic bridges between isolated islands of activity. Networking tends to raise the general level of computing knowledge at the University. For example, as administrators incorporate electronic mail into their communications, the computer becomes an integrated part of their work rather than a foreign object on their desk. Networking also presents excellent opportunities for synergies between administrative and academic computing needs. Academic personnel are increasingly demanding networks, and administrators can piggyback on this demand.

### *Factor 3: Pragmatic Requirements*

We have identified at least three considerations that must enter into decisions regarding solutions. Any solution must:

- Be a potentially high-yield investment. In every situation, we want to look for the highest return on the next dollar spent.
- Fit within the University's culture, which, at the University of Chicago, is highly decentralized and autonomous.
- Build on our installed base of computing or complement our long term computing strategy.

## Where We Are Now

This is a section filled with questions, for our study was only exploratory and we still have many issues to resolve. Some things we can say with reasonable certainty (e.g., a need definitely exists for targeted training). Many other issues are still fraught with questions, often revolving around the pragmatic requirements presented above.

For instance, questions of yield come up in regard to the prioritization of dispersed and centralized administrative needs. One must consider both centralized and dispersed administration and make resource tradeoffs, choosing those needs that offer the highest yield on each investment dollar.

Questions of culture arise in connection with the possibility of centralized system development for dispersed administration. There is little disagreement that data preparation, submission, retrieval and analysis tools on the desktop can greatly improve an administrator's efficiency and, since many administrative tasks are essentially the same, it would seem logical to develop one set of tools and distribute them where needs exist. However, particularly within our strong tradition of decentralized autonomy, a multitude of questions arise in connection with central development: Are there efficiencies to be gained from centrally developed tools? Should each department simply be given the freedom to provide tools as they are required? Is central development cost effective? Can greater leverage be gained from other approaches? Can such tools ever be flexible enough to satisfy the needs of a diverse user group? Can such tools be

effectively supported within resource constraints? Would a centralized approach imply a loss of autonomy, or would it be welcomed?

These are questions we are still exploring at the University of Chicago. Some argue that standardization and centralization are the only efficient way to provide desktop tools. Others counteract, however, that such an approach runs counter to the grain of the University and would be unworkable--and perhaps even undesirable. Like the "invisible hand" in economics, local autonomy allows individuals to adjust their tools according to their own needs, according to their own highest priorities, as evidenced by their payment of cold cash. (However, just as in economics, inefficiencies can and do exist in the "market.") Perhaps the answer to this division lies in a combination of centralized and decentralized approaches, continuing individualized solutions where they have utility, but meeting needs in a common manner where users themselves can identify areas of sufficient commonality and can justify central development.

These same arguments arise in connection with many of the issues raised by this report, such as how to provide support, training, etc. In order to resolve some of the questions, we are currently experimenting with new approaches while concentrating on building an infrastructure that will support innovations and modern administration. A challenge is to manage these experiments in such a way as to 1) coordinate changes, such as networking, that are happening of their own momentum, 2) facilitate desirable changes that won't happen without targeted management, and 3) avoid sucking up resources now to an extent that would preclude trying alternative options in the future.

# Conclusion

The desktop power opportunity offers a wealth of computing power to the information-intensive job of University administration. With so much staff time, including academic staff time, spent in dispersed administration, universities must address the needs of this potentially high-yield area. In order to truly understand the needs of administrators in dispersed locations, however, one must see the world of administration the way the dispersed administrator sees it.

The challenge is to channel desktop computing power in cost effective ways that significantly increase administrative quality and that have the ultimate benefit of changing the way the University works for the better. By investing in its valuable administrative resources, the University can create a richer academic environment to support its primary mission of instruction and research.

# SUPER PRODUCTIVITY, SUPER SAVINGS:

# ACHIEVING THE POTENTIAL OF INTEGRATED ADMINISTRATIVE COMPUTING

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The potential of integrated administrative computing and information systems has not yet been realized in most organizations including higher education. Increased productivity of 50% or more has been cited as a realistic objective. To achieve these improvements it will be necessary to fundamentally alter the structure of our organizations. The organizational paradigm of future high performance institutions will be info-centric - i.e., they will be organized around their information structures. The computer will be their primary communication and information handling tool so it will appear they are also compu-centric - organized around the computer. The organizational design elements of the industrial age must be replaced with design elements much more consistent with the information age. Restructuring of the magnitude required will not be a comfortable process but will be necessary for continued competitive advantage if not survival.

# SUPER PRODUCTIVITY - SUPER SAVINGS

## ACHIEVING THE POTENTIAL OF INTEGRATED ADMINISTRATIVE COMPUTING

### HIGH TECH - HIGH EXPECTATIONS

The promise and expectation of technology has been increased productivity. When the potential of electronic computing began to be realized, the promise of increased productivity from this newly available technology expanded almost beyond hope of realization. Delivery of desk top computers to employees created further expectations for increased productivity. However, according to some experts, organizations are lucky if they can realize as much as a 10% increase in productivity after giving computers to their employees.

Higher education is an industry in which administrative costs have been rising more rapidly than inflation. The costs of complying with additional regulations and reporting requirements are two of the many reasons often cited. Not withstanding the greater need, increases in administrative productivity in higher education have not been much different than other organizations generally.

### LOW PRODUCTIVITY LIVES ON

Many organizational behavior consultants are now suggesting reasons for the continuing lack of increased productivity in spite of the heavy additions of computing power, both hardware and software. The reason for not realizing the expected increased productivity is that computer technology has been laid on top of the existing organization structure which, for most modern organizations, had been structured around the industrial age model.

At the beginning of the industrial age there were no appropriate models to serve as patterns for the large industrial organizations that were to come. Two hundred years later we are in the early information age. Again, there appears to be no appropriate models. All we have are the familiar industrial age models to serve as patterns to meet our emerging needs for more effective organizations. The legacy of the industrial age has been the adoption of well established, almost rigid, concepts that are resistant to change in the information age.

## BECOMING INFO-CENTRIC AND COMPU-CENTRIC

One thing appears certain...successful organizations of the future will be organizing around their information structures. The total information structure of the organization now appears to provide a more suitable focus around which to organize. They will be info-centric organizations - i.e., organizations whose value is based on information and are organized around information. The information structure encompasses everything known relative to the organization from the environment in which the organization operates to the preferences of employees and customers. We will also organize around the computer as the chief tool that makes this possible and thereby become compu-centric as well.

Encouraging estimates suggest that by organizing around our information structures we will enjoy productivity increases of 50% or more. Such organizations will enjoy a more total involvement of all employees who will be far happier as well as more productive.

## OLD ORGANIZATION HABITS

A major transitional effort aimed at the organizational structures in our institutions is needed urgently. Most employees still work for industrial age style organizations. These organizations, in their more rigid and extreme manifestations, can be recognized by their hierarchical structures, their rigid communication channels, management by command, the notion that thinking is a function of top management and that doing is done by those at the bottom. In these organizations, middle management often appears to act as a two-way filter, preventing those at the top from knowing what is going on and those at the bottom what is expected. Work is done as a serial process with the next step not started until the previous one is completed. Tasks are segmented according to the division of labor. Individuals are defined by the position of their box on the organization chart. Employees are rewarded for doing their narrowly defined task, doing as they are told.

Thus, the legacy of the industrial age treats employees almost as machines and views organizations as machine-like structures. So it is that machine theory controls and dominates the organization with task specialization, standardization of performance, centralized decisions, uniform policies, and no duplication of functions. These characteristics have so dominated most modern organizations that these principles are generally accepted without question.

## MORE COMPLEXITY - MORE FUNCTIONAL VALUES

As technology and more complex organization structures have developed over time, wealth has been measured in various ways. It was land in the agriculture age; labor in the early industrial age; and capital in the later industrial age. Knowledge, however, becomes the basis of wealth as we make the transition to the information age. The values of the industrial age also give way to the values of the information age. These values now include knowledge, the ability to see significant patterns, networking, team work, and trust.

The contrast in values between the industrial age and the beginning of the information are essential to grasp: superior/subordinate relationships vs. peer to peer; the confining box on the organization chart vs. each individual's knowledge as a resource; blindly following orders vs. the expectation to engage in dialogue; acting as a cog in the wheel vs. understanding the vision of the total enterprise; operating in automated inflexibility vs. full participation in the discovery process for problem solving.

## TIME FOR TRANSITION

The transition from industrial age organization structures and their ingrained practices to information age structures and their more appropriate practices will be wrenching to those comfortable in the rigid hierarchy typical of those older practices. Those practices appeared to work and provided wealth to individuals, organizations, governments and cultures for two hundred years. Therefore, the urgency to change may be slow in its realization. However, the fundamental terms of the transitional conflict are power (which was the basis of the industrial age model) versus knowledge (which is the basis of the information age model).

The value of the individual employee will be higher in the information age. The valued and contributing employee in the information age will have knowledge. He will be valued, in fact, for all knowledge previously acquired as well as ability to acquire more knowledge. This employee will know how to get things done, what needs to be done by using the ability to discern patterns based on accumulated knowledge, will know when things should be done by developing a sense of timing and an understanding of what is realistic. This employee will know where things can and should happen and will know why they happen by understanding the context within the environment as well as the vision of the organization.

The incentive to move deliberately toward designing and implementing the information age organization is captured in

the idea that "all organizations are perfectly designed to get the results they get."

## TOOLS FOR TRANSITION

Systems theory suggests that organizations have responded to all the influences, intended and unintended, of managers and employees, as well as the larger environment, with the result being the current state or condition of our organizations. In doing this, managers have operated frequently using various fallacies of management including: treating organizations as if they were lifeless (machines); assuming organization goals are the same as the individuals who work for those organizations; ignoring the environment and looking only inward at the organization itself; looking for the "one" best way; looking for single rather than complex cause and effect relationships; dealing only with a portion of the organization while ignoring the effects on the whole; forgetting that the environment determines the organizational purpose; believing that motivation is something that is given, not possessed; assuming that people with different goals are uncooperative; measuring results but not evaluating whether the organizational purposes are still valid.

Systems theory suggests that organizations can be better understood using that theory as a framework. Organizations are, if fact, open systems - that is, subject to the effects of the environment (as opposed to closed systems which are self contained). As such, organizations are alive. They have certain characteristics which must be understood if they are to be transformed (and the transition to an information age organization will likely be as traumatic as major surgery).

## ORGANIZATIONS LIVE

The living organization structure has several components: its boundary defines its limits of operation; its purpose is defined by the environment within which it operates, it has a "contract" with the environment to take certain resources and give back certain products; its inputs are the resources it takes from the environment; it transforms or modifies the inputs through various processes; its outputs are the products that go back into the environment; feedback informs the organization regarding the appropriateness of its purposes; the environment must be satisfied or the organization will not survive.

As a living structure, the organization engages in several system processes. Information coding provides what it knows about the environment. If its coding paradigm is faulty

then essential information will be filtered out and it will be less efficient in meeting the needs of the environment. It seeks a steady state and therefore will resist being transformed from one state (industrial age structure) to another state (information age structure). To survive an organization must take more energy from the environment (negative entropy) than it both uses and returns to the environment. Unlike other living things, organizations can renew themselves. Equifinality, systems reaching the same final state from various starting points demonstrates an adaptive ability. Open systems are self-regulating in pursuing their purposes. Organizations as well as individuals, operating as open systems, will pursue their own purposes. Specialization increases as systems grow in complexity in order to cope with growth and maintain the steady state. Highly specialized organizations will more strongly resist change.

**ORGANIZATION PERFORMANCE MODEL**

The organizational performance model is useful both for assessing the current structure and especially for designing a more appropriate structure. The model consists of five components: the environment within which the organization operates, the strategy used by the organization to interact with the environment, the design elements used to carry out the strategy, the culture that arises from the interaction of the design elements, and the results actually achieved.

The design elements are crucial since they shape the culture which determines the actual results. As managers determine how to carry out the strategy they will make design element decisions, based on their own perceptions and experiences (generally based on the industrial age model) regarding, for example: the tasks people do, the structure in which they work, how they are rewarded, how decisions are to be made, the information they will use, and about the people themselves who do the work. It is especially in this area of design elements that the most recognizable and undesirable effects of the industrial age can be transformed to a design more appropriate for the information age.

In the information age structure the design elements must be more appropriate to support productive people. The tasks engaged by employees can be made more whole rather than the segment usually assigned as a result of the division of labor. The structure must have fewer layers so that communication flows will be efficient. Information must be more accessible with availability not dependant on position or rank. Decisions should be made at the peer level when possible. Trust will need to grow so that checking up on the work of others will be recognized as an unproductive

exercise. Rewards should be based more on contribution rather than job title or seniority.

**ORGANIZATIONAL ASSESSMENT**

The organizational performance model can be used to assess current organizational health. In this process, the parts are analyzed in reverse order starting with a comparison of the results with the future environment. Following this, there is an examination of the operating culture. Next the design elements are analyzed. The actual operating strategy is identified. Finally, the actual operating strategy is compared with the environment.

**ORGANIZATIONAL DESIGN**

The organizational performance model can also be used to design a far more appropriate organization. In the design process it is appropriate to begin with the environment and design a strategy to fit the environment. Next the design elements should be changed as needed. The impact of the design elements on the culture should be identified. Finally, the results to be produced by the new culture should be predicted.

**CHALLENGE FOR CHANGE**

The challenge for higher education is clear. Can we restructure ourselves following the processes that we teach on the academic side of our institutions? Do we recognize environmental threats that should spur us to action or have we become blinded such that no significant threats are visible? Do our institutions struggle to maintain a steady state in spite of clear environmental feedback that change is needed? Our individual challenge is to educate ourselves and our associates about the advantages of operating as an information age organization - organized around our information structures - sensitive to the needs of the environment and the needs of our people.

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# Effectively Merging Administrative and Academic Computing: Indiana University's Experience

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In January 1989, Indiana University's administrative computing organization and the Bloomington campus academic computing organization were merged by an agreement between key administrators and faculty. University Computing Services, the resulting organization, has since undertaken and completed a major reorganization. The reorganization was carried out in consultation with representative administrative and academic end users. The new organizational structure encompasses all technological and service delivery components for administrative users in the eight-campus IU system and academic users on the Bloomington campus. An initial evaluation of the merger and reorganization is now possible. This paper provides that evaluation, along with a description of the context of the merger and the resulting reorganization.

The merger of Bloomington Academic Computing Services (academic computing) and Information Services (administrative computing) that took place on 1 January 1989 at Indiana University has had substantial consequences for computing at Indiana and elsewhere. The merged organization, University Computing Services, went through an 18-month period of reorganization that resulted in a structure that little resembles its predecessors. Arriving at this structure took extensive consultation with academic and administrative end users to identify their needs, and many discussions with a large part of the University Computing Services staff. The structure has proven effective in encouraging excellent quality service delivery and technological innovation. This paper address the historical context of the merger, the organizational context of the reorganization, service delivery and technological innovation in the new organization, and end users' perspectives on the results of this merger and reorganization.

**The Historical Context - Barry M. Rubin**

This section of the paper provides some background on the two former computing organizations at Indiana University, and on the environment and factors leading up to the merger that created University Computing Services. Several major differences are immediately apparent with respect to the structures of the former computing organizations. First, the academic computing organizations reported to the Bloomington campus vice president while the administrative computing organization reported to the eight-campus, system-wide executive vice president for finance and administration. Second, though both organizations had operating budgets of approximately $10 million in 1988-89, 90% of the academic computing budget was subsidized by the Bloomington campus, while 60% of the administrative computing budget was based on user charges. Academic computing staffing stood at 100 FTEs and 70 part-time consultants and hourlies as opposed to 130 FTEs for administrative computing. Each organization had three major divisions, but academic computing had 12 management units all on the Bloomington campus; administrative computing had 17 management units, two of which were on the Indianapolis campus.

Two major differences between the organizations were in computing resources and network technologies. Academic computing had ten VAX minicomputers, a CDC 170/855, an IBM 3090/120 with VM/CMS, and about 500 PC and Macintosh workstations in student computing clusters and classrooms. The main academic communications network was based on asynchronous technology that was quickly becoming dated, with a slowly emerging Ethernet-based TCP/IP replacement. Administrative computing's primary central resource was an IBM 3084Q mainframe, with MVS, CICS, TSO, and VSAM file structures. The administrative network was IBM's SNA.

The advisory structures for these organizations were also drastically different. Academic computing utilized a 38-member faculty advisory committee that participated in all major decisions and policy making. Administrative computing had only a systems development review board composed of eight representatives of IU vice presidents, and served exclusively to allocate a $1 million systems development subsidy fund.

The missions of these two antecedent organizations also differed markedly, as one would expect. The mission of administrative computing was focused on transaction processing, management information systems, and report generation; its primary client group was administrative departments. The mission of academic computing was to provide research and instructional support; its primary client groups were faculty and students.

These differences in structure and mission were certainly important. But the primary differences between the two organizations, the ones that proved the most difficult to deal with, were the two disparate cultures of computing that arose as a consequence of these dissimilar organizational structures and missions. The administrative computing culture is best characterized as dominated by centralized decision making and a hierarchical management style; business dress and hours; applications developed or maintained by the staff using a predefined methodology (SPECTRUM); computing staff desktops occupied by IBM 3270 terminals or 3270 PCs; a strong commitment to customer service; a single-vendor (IBM) computing environment; and a production-oriented data center with multiple back-up plans and change management processes. The academic computing culture, by contrast, had consensus-based decision making with a variety of management styles; many employees who dressed informally and kept hours similar to those of faculty and students (i.e., anything but 8 to 5); applications developed primarily by end users;

computing staff desktops occupied by PCs, Macs, or advanced workstations; excellent user responsiveness; a multi-vendor "open" computing environment; and central computing resources which were not "production-oriented" or particularly (at least in the opinion of the faculty) well managed.

An important aspect of the environment immediately preceding the merger is the satisfaction users felt with the separate computing organizations. Administrative computing users felt they had a stable, dependable computing environment with excellent-quality transaction processing and a production-quality network. Administrative departments that relied on these systems for their day-to-day, mission-critical business could be operational 99% of the time. Response time for CICS transactions had improved dramatically over the past few years to the point where users were satisfied, if not downright happy, with performance. In addition, administrative end users employing the FOCUS report generation language against VSAM file structures could access institutional data for ad hoc reporting purposes. While this certainly wasn't relational database processing with natural languages, it did give some access to the data without requiring CICS and COBOL programming skills.

Yet administrative end users felt a good bit of frustration that emanated from a failure, on the part of the leadership of administrative computing, to be truly responsive to user needs. End users were generally excluded from helping to establish long-range directions for the evolution of the administrative computing function. In fact, for the 10 years before the merger, there was little evidence that planning for such directions had taken place. With respect to systems development, while end users could partner with Information Services to identify user requirements and specify the preliminary design of systems, they were effectively shut out of participating in the implementation stage. Even though several administrative departments had computing staffs of their own that were just as capable as those in Information Services (and may have in fact come from Information Services), access to the development environment was the exclusive domain of the administrative computing organization. Furthermore, decisions about priorities for new systems development projects were not made in an objective way, but were politicized by the agendas of the eight members on the systems review board. If an end user department was not well connected with one of these representatives, the likelihood of having a project successfully funded was considerably reduced. Small units, in particular, often received very little attention, no matter what the merit of their proposed projects.

Though FOCUS access to institutional data files was available, the training required to use this tool against VSAM file structures intimidated most end users. There are only 200 to 300 active FOCUS users in a university of 10,000 employees. Many potential cost-effective uses of institutional data are going unaddressed due to a lack of access tools such as relational database management systems and fourth-generation languages. This problem was exacerbated by slow implementation of a promised data administration function. Another frustration for end users was the lack of documentation on using systems and on the technical specification of application systems.

From the perspective of the academic end user, particularly faculty members, the ability to use central computing resources without charge has been a great boon to research. The faculty advisory committee reaffirmed this academic computing policy continuously throughout the 1980s. In 1988-89, the Bloomington campus had a central computing environment adequate for most research and teaching applications. A student technology fee was implemented by the campus beginning in 1987. This resulted in PC- and Macintosh-based student computing clusters and classrooms that allowed faculty to begin incorporating microcomputer applications into their courses. Although the intra-campus network was beginning to cause response time problems, it did provide a functional environment for campus and inter-university communications.

However, a significant number of faculty, especially in the sciences, were not well served by the academic computing environment. They needed more computing cycles devoted exclusively to research. The response time in the VAX environment and on the network was also becoming an irritation to many faculty — significant problems and delays occurred at peak usage periods during the academic semester. Slow implementation of an automated catalog for the campus library was also a major frustration for faculty and librarians. Though both computing organizations were working on this project (the library system was being developed for the IBM mainframe using NOTIS but would be delivered across the academic network to faculty offices and student clusters), progress seemed

slow. Faculty and librarians had been promised this system for so many years that the commonplace attitude about its delivery was skepticism. Faculty were also frustrated by their inability to get access to the institutional database for applications that could assist them in carrying out their instructional or advising/administrative responsibilities. Another major concern of academic users was integration of the academic and administrative networks for such mundane purposes as the ability to send and receive electronic mail from users of the administrative computing environment (not to mention use of the automated library catalog, should it ever be implemented).

Academic end users were also concerned about the lack of a voice for faculty or student needs in the establishment of administrative systems development priorities (not too many faculty were well connected with vice presidents or their representatives). A final desire of academic end users was the addition of staff to the academic computing organization who had sufficient technical depth to address upcoming issues such as client-server technologies, UNIX-based computing, advanced workstations, and distributed databases.

The most significant of the driving forces and enabling factors for the merger was a substantial change in Indiana University's administration. A new president took office in fall 1987, and a new vice president for finance and administration came to the university shortly thereafter. Coming from the private sector, this vice president was unaware of the litany of reasons for separate academic and administrative computing enterprises. As a result, he served as the catalyst for the merger, and was one of the two primary decision makers in this process. One rationale for the merger was the growing recognition among the administration that the cost of computing was escalating at a time when cost-containment was becoming essential, and that merging the two units would result in some cost savings that could be redirected to pay for new services. Two factors mentioned previously, slow progress on implementing the automated library and integrating the administrative and academic computing networks, also helped drive the administration in the direction of the merger. Finally, the relationship between the leadership of the administrative computing organization and end users (both administrative and academic), and between the university administration, had been characterized by varying amounts of tension and distrust throughout the 1980s.

Several other factors contributed to staff and faculty agreeing to go forward with the merging of the two computing organizations. First, there was a substantial amount of confidence in the potential leadership for the new organizational structure. Second, at least on behalf of the faculty, there was a perception that the potential benefits (e.g., an automated library catalog and integrated networks) outweighed the risks. Third, administrative and academic end users were involved in the merger effort from its inception. Finally, the university and campus administration reached an agreement that guaranteed a) a dual reporting line so that the new organization would report to the campus vice president on academic computing issues and the system-wide vice president on administrative computing issues, b) separate academic and administrative budgets, and c) an ability to return to separate organizations (i.e., "push the reset button") if the merger did not succeed. These guarantees were instrumental in convincing both faculty and administrators to endorse (but not without some trepidation) the merger concept.

**The Organizational Context - Polley Ann McClure**

This paper examines the organizational context for the merger of computing at Indiana University in three parts: the process, the strategic plan that guided the organizational design, and the specific structure for the new University Computing Services organization.

Accompanying the service and policy goals that helped drive the merger were goals for the process of accomplishing the merger. First, it was essential not to lose focus on the basic business of the institution even during the process of reorganization. This process has been described as taking off simultaneously from Heathrow and Frankfurt in two Boeing 707s with crews that speak different languages and in flight, over the Atlantic, redesigning and rebuilding the planes into one 747. Paychecks had to get out, and researchers' tools had to remain available. Second, the merger offered a chance to develop a new technology architecture for the university — neither former organization had been in a position to "escape its past." Third, we sought to rapidly bring the incompatible networks, systems, and applications into technological convergence. And fourth, we sought increased responsiveness and flexibility.

Indiana University was and still is in a period of very significant change in all aspects of its function, brought about in part by a new administration, a new academic agenda, and programs to improve the efficiency and productivity of the administration. The new computing organization has to be responsive to that change, and able to assist other units with the change that faced them. Fifth, the merger must be managed to make organizational change at least acceptable, if not pleasant, for staff. And finally, staff should remain engaged with their work and committed to the organization and to Indiana University.

The process of the merger contributed to its success. We began by polling our users and customers to determine the services and support they anticipated needing in the decade ahead. From their answers we derived a service portfolio and support environment. Once we had a picture of needed services, we could devise a plan for the technology and place the appropriate emphases on the respective types of technology. We planned how to get from where we were to where we needed to be. Finally, we designed an organization that had the structure and the set of functional rules that allowed us to deliver the service, technology, and support environments. The important thing is that we designed the organization *last*, not first.

The main process took about 18 months. We set up an interim management structure in which the associate directors from the two former organizations reported to me. The two organizations ran as a grafted-together whole for about a year until we completed plans for the new organization. In a series of weekly operational meetings we made most of the important organization-wide decisions. While acting as interim managers, the associate directors and I formed a core planning team. We commissioned a task force of users and customers to identify their key service and support needs. Our planning activity took place in a series of evening "pizza meetings." Working in teams, we developed a series of papers describing our service, systems, and network architectures, and the organizational design that would support them.

The first group products to emerge in spring 1989 were a drafts of a new mission statement for University Computing Services and a list of shared values to guide its operation. These documents were highly useful; they did then, and still do, serve as informal documentation of, and a contract for, the directions we adopted. As the drafts became available, they changed the brainstorming focus of the pizza meetings to critique, review, and revision. Finding that many of our assumptions and technical vocabularies were at odds, we devoted time to "intense mutual education" to better understand each other's business and one another as individual professionals. As these drafts stabilized we distributed them to the managers and supervisors, then over brown-bag lunches, discussed and revised the ideas. As the drafts evolved, we distributed them to outside staff groups, advisory committees, to our bosses and colleagues. The process resembled a circle beginning at the outside with user input, spinning to the center, then through the processes of consultation, argument, and revision, spinning into an ever-widening series of circles. Though we remained open, staff began to get restless about mid-spring. We circulated a status report, and two weeks later, a draft of the organizational design draft.

Once we agreed on the organizational design, we began to recruit for the associate directors to head the new divisions. We declared all of the associate director positions "open," invited applications, and conducted a national search. By November 1989 all but one of the positions were filled. One came from outside Indiana University, three came from former associate director positions in the two organizations, and two came from other ranks in the old organizations. We appointed an acting AD in the unfilled position, reopened the search, and began unit-level planning.

We realized early on that we would need some flexibility in staffing if the organizational structure were to differ from that of the two previous organizations. We had put a soft freeze on vacancies that occurred during the year or so of intense planning activity. By November, the end of the first year, we had accumulated about 25 or 30 vacant positions. We now invited staff to indicate their preferences for assignment to the new divisions. Most wished to continue roughly as they were. The 10 or 12 who sought change were interested in the new workstations and networks divisions. Each associate director then developed a draft unit plan requesting the number of staff positions needed to do the work. The total positions requested doubled the number we had! We negotiated the numbers back to

the original number of positions. Next, staff names were written on index cards and "auctioned" to the associate directors to fill the number of assigned vacancies.

About 85% of staff were positioned this way with relatively little disagreement. The remaining 15% tended to be the technical stars. These were young, technically excellent people whose skills could be used in a number of different positions. We resolved those conflicts by inviting the individuals to decide their divisional assignment. At this point staff were apprised of their new assignments, but were asked to retain their old responsibilities until they had been formally accepted in their new positions. We used a ball carrying metaphor: "Don't drop any balls."

Spring 1990 was devoted to individual units' internal plans and responsibilities, and to recasting the organization budget. By late spring we were badly stuck in gridlock: new owners couldn't accept new responsibilities until they could pass on old ones; but the targeted new owners faced the same dilemmas. The planning team was faced with unresolved details of responsibilities, that now surfaced as squabbles and questions. These unclear responsibilities we called "cloudy balls." We invited all staff to list what for them were cloudy balls, then spent an afternoon resolving them. Progress resumed, and by May we seemed close to being settled with our new responsibilities.

The process of developing a strategic plan was a key step in designing the new organization. The faculty and staff committees had helped us identify a series of five major goals for the next five years. First is the need to develop a modern distributed computing environment for Indiana University. That has three very important components: 1) a single ubiquitous high-speed data network that can link all of the workstations with all of the university information and computing resources within university, 2) the delivery of sufficient shared computing resources and information, and 3) a major new emphasis on developing workstation-based computing. The second goal was to improve and enhance access to institutional data. The third: make major improvements to the student computing environment. The fourth goal called for developing the support tools that would enable faculty, students, and staff to use these resources and programs. Finally, we needed to act so as to enhance service quality while containing costs.

The former computing organizations reported to separate vice presidents, coming together only at the level of the university president. Each organization had three main divisions. Both had one dedicated to large-scale or time-shared computing systems. The academic organization had a "network services" division to oversee distributed computing, and an "information services" division to provide education, publications, and consulting services and the internal business function. Administrative computing had a data center, a division devoted to systems development and information access, and a small business office function.

The new organization consists of six divisions. Four focus on technologies and two on support. This new organization reports jointly to the vice president for finance and administration and the vice president for the Bloomington campus. The Management and Administration division is responsible for publications and all of the internal administrative and management functions. Information Systems is the systems development and data administration division for both academic and administrative information needs Workstation Systems supports personal computer and advanced workstations for students, faculty, and staff. Network Systems manages both administrative and academic wide-area networks and supports LANS. Computing Systems manages all of the shared computing resources including the IBM mainframes and VAXcluster. Support Systems provides the educational programs, consulting, and support that underpin the other functions. Another way of looking at the organization (and the way we conceived it) is as a matrix with four technologies, each with internal divisions for technology standards and planning, applications, and service delivery in their own domain. Support Systems and Management and Administration span the whole. We've already seen some slippage in the symmetry of the theoretical design. Computing Systems wants to slip the noose on applications. Workstations Systems wants to pass the development of administrative applications on workstations to Information Systems. The design's biggest weakness is the problem of coordination across these technology units.

## Service Delivery and Technological Innovation - Susan Stager

Prior to the reorganization, the administrative and academic computing centers (and the campus) believed the needs of academics and administrators differed significantly — hence the need for two computing organizations. Interestingly, prior to the reorganization, the services provided by IU's administrative computing center and by its academic computing organization, *on paper*, appeared identical. In reality, these services were very different. The documentation provided by one organization bore little resemblance to that provided by the other. The overlap in training services was primarily in word processing, and even then we saw differences in class length, the speed of presentation of materials, and topics. Both organizations offered central system cycles, but on different platforms. Users could lease one type of equipment from one organization, but not the other; or worse, users could lease the same type of equipment from either organization, but at a different price. A major task of the reorganization was to create an integrated service environment reflecting the best of both preexisting computing organizations.

Prior to the reorganization, UCS support units were concerned that after the merger, the support needs of one constituency would take precedence over the support needs of the other. Academic researchers felt that the old Academic Computing organization had given them the highest priority, and feared the new combined organization would not have the same set of priorities. Administrative customers such as the Registrar and Bursar felt that the old Information Services organization had given them the highest priority, and feared the new combined organization would not have the same set of priorities. Our constituencies saw everything as black and white: Which was more important, they asked, compute power to support cancer research or compute power to support the university payroll system? Luckily for us, it was not back or white. One of the most creative things we have done since the merger is to allow one of our top researchers in the hard sciences to "soak up" excess cycles on the administrative mainframe. We've located the grey area in service delivery and we are capitalizing on its existence.

We decided administrative and academic customers had basically the same support needs, though we know it's a topic of much debate. Some critics say that the word processing and communication needs of administrators and faculty differ. Our experience has always been that the word processing and communication needs of any two administrators or any two faculty differ, so we are not overcome by differences *between* faculty and administrators. We still maintain there are more similarities than differences in support needs. Both faculty and administrators want quick, accurate answers to their computing questions and they want assistance as painlessly (both in mental and financial terms) as possible. Meeting these criteria of "quick," "accurate," and "painless" is no small feat. Though many of the computing applications are the same for administrative and academic users, their use of those applications may differ. A researcher may use word processing for a long document; an administrator might want to merge form letters with a list of alumni. So the support services staff need the depth of skills to match the width of services.

The support services structure of the combined organization has now solidified. We recognize, however, that support services' structure must always be fluid, constantly adjusting to the new needs of the users, new technology, and new funding concerns. Currently, the new support organization has five units: the Support Center, Cluster Consulting Services, Departmental Consulting Services, and IUPUI Support Services. (IUPUI is another campus of Indiana University, located in Indianapolis and jointly operated by Purdue University and Indiana University.)

The Support Center supports fundamental uses of all "supported" or "user-required" technologies. It provides direct technical consulting, assistance, and information via telephone, electronic mail, and visitation at our various business sites. This unit operates the "Information Center" and "Help Desk." These two telephone hotline and walk-in service centers were components of the old organizations. Because of the allegiance our administrative customers have to the Help Desk, and the allegiance academic users have to our Information Center, we created an umbrella unit, the Computing Support Center. Though it is not obvious to either constituency, were are integrating staff from the Information Center and Help Desk, to create a staff with broader knowledge and provide back-up personnel in each area. Specifically, if we have an absentee at the Help Desk, a staff member from the Information Center can substitute as easily as another member of the Help Desk staff. We gained depth and breath without adding staff.

Cluster Consulting Services provide technical consulting, assistance, and information (primarily via on-site staff, but also by telephone and electronic mail) at the Bloomington campus public computing sites. We currently operate 24 such facilities, typically containing 25 workstations and assorted software. These public facilities are the focal point for assisting students with both workstation and central system hardware and software problems. With few exceptions, staff are students themselves, from a variety of disciplines, working their way through school.

Departmental Consulting Services help academic and administrative departments plan for computing technology, secure funding for computing technology, and arrange chargeback services to meet departmental needs. Both the academic and administrative organizations performed these functions before the reorganization, but each claimed that the other approached these tasks incorrectly. Specifically, the administrative organization believed in extended planning efforts, while the academic organization was more action-oriented. It was rumored that staff from Information Services held meetings to "plan for planning," while academic staff members prided themselves on their "paperless" offices. As part of the reorganization, administrative staff members agreed to teach the academic staff how to write planning documents, and the academic staff to teach the administrative staff how to dust shelves. (Administrative staff thought you dusted shelves by throwing away the top layer of planning documents.)

IUPUI Support Services serves as the primary liaison for users at the IUPUI campus and campuses in the northern half of the state. It also provides front-line consulting and referral services for users of our central systems and is responsible for Computing and Network Systems functions at IUPUI and the northern campuses.

Prior to reorganization, both administrative and academic organizations held significant support burdens. As a consequence, technological innovation was often done on the margin, even among those charged with it. For example, on the academic side, the graphics specialist was drafted to work two days a week on the front line at a microcomputer support center, reducing the support burden at that site. A global plan for graphics was never developed and innovation was a function of which user screamed loudest and longest for a new graphics application.

The reorganization provided the perfect opportunity for a shift in priorities. A Workstation Unit was formed with its own associate director, providing a focus for workstation innovations for the first time. In the strategic plan document is listed the objective: Build a workstations unit. We will continue to unify the expert staff to plan, develop, and support the workstation-based technologies that are essential to a distributed computing environment.

We made a concerted effort to enhance the technology units of the new organization, sometimes at the expense of the support units. For example, unfilled vacancies from the two separate organizations were "frozen" during the restructuring period, and reallocated to two of the technology units (Workstations and Networks). Thus, while there were few new positions in the organization, old positions were in some cases redefined as "technology" positions.

While vacant positions were being redefined, the support service units were charged with distributing support. Two educational series were generated for people outside UCS who were charged with supporting the computing needs of their department. One series is a LAN Management Series, now in its third rendition; the other, a Workstation Series, released this fall. Their goal is to educate external support people to be able to meet most of their department's computing needs, and thereby help reduce the support duties of the support and technology units.

The potential for technological innovation was also enhanced by increasing the number of external support people, again reducing the overall support burden upon our organization, and ultimately freeing up the technology staff. This is not a novel solution. Any computing organization will admit that it could increase its potential for technology if funding could be found to add computing support staff to external units. What is new is that we achieved this at very low cost, with existing funds. We determined that for $100,000 we could hire approximately 8-10 graduate students and allocate them to external units. We would provide the training, when possible, and guarantee that these student employees had access to our technical staff. We scraped the $100,000 from the fat of our existing budget at a time

when none of our staff believed that we had any fat. Again, the net effect was to reduce the need for technical staff to supplement support staff, thus increasing the amount of time technical staff were devoting to innovation.

**University Computing Services (UCS): An End User Perspective - R. Gerald Pugh**

I should say now that I speak as one end user, not on behalf of all end users. IU is an institution of 92,300 on eight campuses with 3600 full-time faculty, so I'm not sure we could find anyone willing to try, much less succeed in representing all end users. The Registrar is as dependent on computing as any end user could be, and at IU-Bloomington, the residential campus with 35,500 students, has been since the early 1960s when we set up computerized registration and records. We've valued that dependence over the years and I begin with an illustration.

In 1982, we implemented an online schedule of classes at Indiana University-Bloomington in preparation for the online registration that followed in 1983. These systems were built for the administrative computer and network; there were charges for both access and video terminal use. This prohibited most academic units from making the best use of the schedule of classes and registration systems in course schedule advising and in determining the department offerings and class sizes. Most academic units had plenty of terminals, but they were a part of the academic computing network for which there was no service charge. Since building the schedule of classes and registration are proxy activities conducted by the Registrar for the academic units, it was ironic that this dual network arrangement prevented faculty from seeing online student registration choices in comparison with their schedule of offerings. Some departments bought access to the administrative network but felt bitter about having to pay extra for limited value; others used the daily paper reports which we provided but these were not a substitute for immediate information. Faculty advisors could not use the immediate class count information. Students preparing to register also had no computer access to the class information because they were a part of the academic network as well.

This illustration represents the administrative/academic computing dichotomy that existed with our technical environment. In under two years, organization and technology have worked to eliminate such barriers to access. In the first six months after the merger, efforts were made toward a high speed, university-wide generic network to interconnect all computing information resources and workstations. High on the list of issues was the creation of an Administrative Computing Needs Task Force of which I and several other users were a part. Participation and involvement were important first steps. The task force worked diligently and the report identified seven goals:

1. Institute an information technology environment characterized by responsiveness to clients and end users (also labelled primary users and beneficiaries). Establish mechanisms to meet their information needs, and help them develop new uses of information technology to enhance their administrative functions.

2. Develop, deliver, and support integrated systems that fulfill the information needs of students, faculty and staff, including decision support systems, academic support systems, and administrative support systems.

3. Develop and maintain a high-speed electronic network and support structure linking the entire university community. This infrastructure will include basic services provided to all network users, such as electronic mail and the ability to transfer data, text, and graphics between workstations and other network resources.

4. Provide for the maintenance and enhancement of the existing administrative data center and the administrative information systems.

5. Lead in assessing, evaluating, and implementing emerging technologies to improve information access and decision making in departments. Encourage and promote entrepreneurial behavior in information technology and cooperative ventures between University Computing and the computing users in other departments.

6. Review the current funding model for administrative information processing. A reasonable plan for financing, subsidizing and charging for information technology services is essential to the success of the University Computing enterprise.

7. Establish an advisory group (or groups) to identify the needs of the many different types of clients and end users, and help set policies and priorities for the administrative computing function within the university.

It is significant that such a task force of users was convened to address administrative computing needs and that they were given a charge to cover what needed to be addressed in their report. It is also significant that Dean McClure heeded the report; the recommendations became a part of the organization's strategic plan; and now the recommendations are being or have been implemented as a part of that operating plan.

From this, I see the following five initiatives of major importance to users:

1. Current service levels for activities on the administrative mainframe are being maintained and, in some ways, enhanced. Stated another way, to do more and to implement change, no matter how desirable, we must still be able to maintain system reliability and response time. We depend too much on operational systems to consider alternatives. Further, the argument of suffer now for gains later is not acceptable in this period of consumer attention. Capacity and reliability must be in place before new systems are implemented, not after.

2. Vision is based upon advisory groups and staying close to the customer. The Administrative Computing Needs Task Force gave way to the standing Administrative Computing Advisory Committee with sub-groups for such tasks as identifying priorities and approvals for administrative systems development projects. Two other task forces have also been at work: the Access to University Information Task Force and the End User Computing Task Force.

3. The effort is to make information accessible. I've spent most of my working life trying to marry technology with task and promote the use of information for better decision making. It is critical to users that our computing partners share this goal of accessibility. The Access task force has made more information available to faculty, staff, and students. We can now develop, implement, and operate systems for computer-assisted advising, registration, class schedule adjustment, grade reporting, address collection, and transcript ordering, among others, which can be accessed through the entire terminal network on campus and through dial-up methods, making it possible for students, faculty and administrators to retrieve information and perform academic support tasks from the same devices used for teaching and learning. We are in fact now doing this with the degree audit record, student directory, and schedule of classes. We are currently working on approved projects for extending our online registration through all campus terminals and dial-up modes.

4. The emphasis today is on partnerships — with beneficiaries, primary users, developers, maintainers, data stewards, and executive management. As Dean McClure has noted, "the unit for which the system is being developed needs to take the lead in defining the tasks the system will perform and the way it performs them." The needs task force noted that technical skills are becoming so pervasive and needs so great that all systems development cannot be funnelled through a single group of programmers/analysts at the computing center and the university's work get done. There is a backlog of projects and it's gaining on us; this trend will continue unless we use more and more of all available people to fulfill the goals. The End User task force identified ways to permit technically capable, non-computer-center staff to do more systems maintenance development.

5. The new computer organization reflects the vision of the future as outlined by the task forces and the computing strategic plan. Many people now have new jobs, different jobs, or modified jobs. Culture clash and resolution have occurred as two quite different organizations were put together. Those of you who heard the Indiana University presentation at CUMREC last May have a real sense of the dimensions of these differences. I think some users have also had culture clash problems as some academics think that

administration will consume more of the computing resource and some administrators think academic and research concerns will overshadow administrative mission-critical tasks for the operation of the institution.

Are there some problems noticeable to users? Yes.

New Demands -

As we make more information available to users of the academic network, faculty, staff and students are able to take a more active part in decision making. Users of information that is becoming available are creating a considerable demand on the academic computing network. Our increased client base has caused a decline in the ability of the academic network to deliver the computing power required for increased accesses.

The time-dependent nature of the information delivered in support of ongoing service demands and decision support systems represents a new dimension in the academic computing environment. The reliability of the administrative computer for online production systems may be overshadowed by the inability of the academic computers to support the demands of the information users.

Hardware and Network Support -

During the UCS merger staff and management responsibilities shifted from one group or manager to another. There was often difficulty in obtaining information and delivery of certain services. This was particularly true in the areas of delivering computing hardware and obtaining network connections.

The demands on general help and support staff at UCS have also increased as a result of the merger. Because the technical nature of the academic and administrative computing environments differs significantly (VAX vs. IBM), support staff from both former organizations must now anticipate a much broader range of questions from clients who may know the information but are unfamiliar with the new access paths or vice versa. The merging of the two environments has not yet filtered down to all levels of the organization, particularly to those who are in daily contact with users and who require immediate response to technical questions and problems related to access.

User Application Support -

As information delivery systems were offered across the academic network, it was not clear to clients whom to call for help with applications. The new clients (faculty/students) were not (and are not) used to calling the administrative support staff for help, and the academic support staff are still not trained in the applications being used.

Effects of Size -

The new organization is very large and the management structure is commensurate in size as well as complexity. Inevitability, size creates and dictates a more complex environment. Communication with 250 people is more difficult than communication with 100.

Some concerns for the future as we move forward.

Client Support -

As our applications are made available across the academic network, UCS and administrative offices will increase the number of clients they serve via online computer applications. This will create the need for new types of security procedures and client support structures, and create demand for more sophisticated information retrieval. The information provider (Administrative Office) and the messenger (UCS) will need to act as partners to successfully deliver effective information systems to students, faculty and staff.

Distributed Computing -

Greater availability of computing via PCs and desktop workstations has created the vision of a distributed computing environment. Identifying and using this technology needs to be carefully considered.

End User Development Tools -

UCS needs to provide development tools for the rapid generation of user-developed administrative applications. The tools should enable the user to easily create ad hoc information reports and create transaction-based applications for the support of their own administrative functions. In addition, UCS personnel should support and be able to maintain applications developed with these tools.

Integrated Data Architecture -

UCS should be the technology leader in the development of new data architectures. Implementation strategies should include the smooth migration from one architecture to another.

Balance Between Technology and Service -

UCS must strive to keep in balance the services required to meet the varied needs of users and beneficiaries as well as keeping up-to-date with new technology. Too much or too little emphasis in the service direction can result in too little or too much being spent on new technologies.

Are we where we want to be? Not yet, but I believe, from the user's perspective, the pieces are in place to get there.

**Conclusions and Lessons Learned - Polley Ann McClure**

We have learned a lot from this reorganization. It has been expensive. Direct costs (interview expenses, moving staff offices, consultant fees) totalled about $257,00. Organizational planning costs (time spent in planning meetings and developing the architecture documents) reached $136,000. Unit planning (time the associate directors and their staff spent creating the new divisions and establishing unit responsibilities) cost $252,000. "Salary creep" from our attempt to increase the professional/technical level of the staff came to $444,000. This included new hires with higher salaries and promotions for some stars. The total came to about $1 million — about 4% of our budget. These may be minimum costs, but we did not write out a check for this amount. To some degree, the time spent on the planning and organizing could otherwise have been available for other work.

We were concerned that we would experience significant loss of staff during this process. The amount of change, the uncertainty about the future technical directions of the organization, all could have generated significant losses. We are pleased that this did not happen. The turnover rate during the year of reorganization was in the range of the historical trend the previous three years in the two former organizations.

We noted a number of other kinds of costs. One, of course, is stress — a significant cost to users as well as to staff. (I gained about 5 pounds!) Another category I call navel gazing — the tendency on the part of staff to develop an introverted and contemplative posture and dwell on the belief that they and this organization are the most interesting and most important thing in the university. I believe we are now past most of these high-cost activities.

On to some benefits. Some we hoped for when we began the merger, but others we didn't anticipate. First, we did meet our service obligations during the merger. The paychecks were delivered. (The 747 did indeed land in New York!) Second, the library project was completed on time and within budget and in a context of an open network. When the library catalog went public, individual professors accessed it through the campus network from their offices. The network may be the most visible and important benefit of the merger to date. Though the network is incomplete, campus awareness about its purpose is significant and people appreciate the services already delivered. Another benefit: we have adopted a hybrid strategy for relational database technology, including a relational product on the administrative mainframe and an alternate platform as a front-end for data access. In a project called "Workstations for Administrators" we're introducing to a very conservative arm of the university — the division of

finance and administration — the benefits in work style and productivity that characterize the networked workstation environment becoming prevalent in our academic units. We have installed Mac IIci's on the desks and in the homes of the top executives and their assistants in this division and we are about three-quarters of the way through a major training program for them. We are seeing significant excitement in that group.

Other benefits were more subtle. We got a rare chance to do a ground up technology and service redesign for our organization. If you have that chance, seize it with relish. Further, our visible planning and reorganizing opened new communication with users — they're very interested in what you are doing (very concerned that you don't mess up their environment). Another benefit may not be initially apparent. In both original organizations we had neglected some personnel problems that had been too nasty to deal with. The personnel reassignments that came with the reorganization made it easy to resolve these without harming the individuals. Finally, such change gives us all a chance for professional growth. Most staff benefitted, and women did disproportionately, not through deliberate activity on our part, but because we had excellent women, qualified for advancement. These changes allowed them to move forward, unencumbered by whatever had constrained their promotion in the old organizations.

The most important observation I can make is this: widespread participation from outside and inside the organization is critical to success. The openness of this process carried some cost, but the benefit is that everyone feels that they had a chance to take part, and they have some stake in the result of the process. If you are after organizational change for the long term, this investment in participation is essential.

Second, the senior executive leading this process must allot enough time — this cannot be delegated. You must play a visible, active, full-time part to assure your staff that the process is working. Once you announce a new organizational structure, managerial and director-level staff abrogate almost all decisions until their new assignments are secure. This means all decision making, important and trivial, gets bounced up to the Dean's office. During its height, I spent 70-80 hours a week working on just the reorganization.

Third, focus in advance on the mechanics of organizational change. (We could have handled this better.) If we had it to do again I would appoint one operational committee in each former organization. Beginning on the first day of the planning process they would document in writing and flow charts the processes their organizations used to deliver their main services. (For example: Where do users establishing new accounts make their requests, and what steps are involved in delivering the services?) The operational committees would use these data to draft new processes. We did not do this, and the new owners of responsibilities spent considerable time developing new procedures on the fly.

Fourth: if you want to promote radical change you have to change things radically. Our customer/user/advisory groups early on let us know of very significant changes they wanted — changes that wouldn't have been possible to generate in the near term in the context of the two old organizations. We had to start from scratch to allow ourselves the focus on new directions. That's expensive, but the only conduit to the profound changes we wanted.

Finally, organizational evolution is never finished. The time between making the decision to the time that we had a new, forward-moving organization in place was about 18 months.

This big, complex business of reorganizing computing services at Indiana University into one unit was one of the hardest things I personally have tried to do, and one of the most rewarding. As we began the process I ran across a little book by Robert Fulghum called *All I ever really needed to know I learned in Kindergarten.* I read it for fun but came away with the perspective that I think put our efforts in the proper place. I realized that many of the principles we needed to employ in our reorganization were indeed very simple, even childlike. Things like "Don't hurt other people," "Clean up your own messes," "Hold hands, stick together and look before you go across the street." The processes we described here are about serious, important issues. But through them ran a thread from Fulghum's essays. We did our level best not to lose sight of the basic human needs of the people affected by our reorganization and we believe that was a major factor in our success.

# Developing a Circle of Services for Microcomputer End Users: A Cost Effective Approach

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The Circle of Services for microcomputer end users at Bowling Green State University consists of the following four quadrants: 1) BGSU Microcomputer Resources Handbook, 2) Microcomputer End User Roundtables, 3) Microcomputer/Networking Feasibility Studies, and 4) External Microcomputer Resources. Each quadrant is based on a foundation of customer service, and feedback from the user community indicates that the proper foundation has been established.

Emphasis is placed on the goals associated with each quadrant within the Circle of Services. In addition, procedures for developing each of the service components is presented.

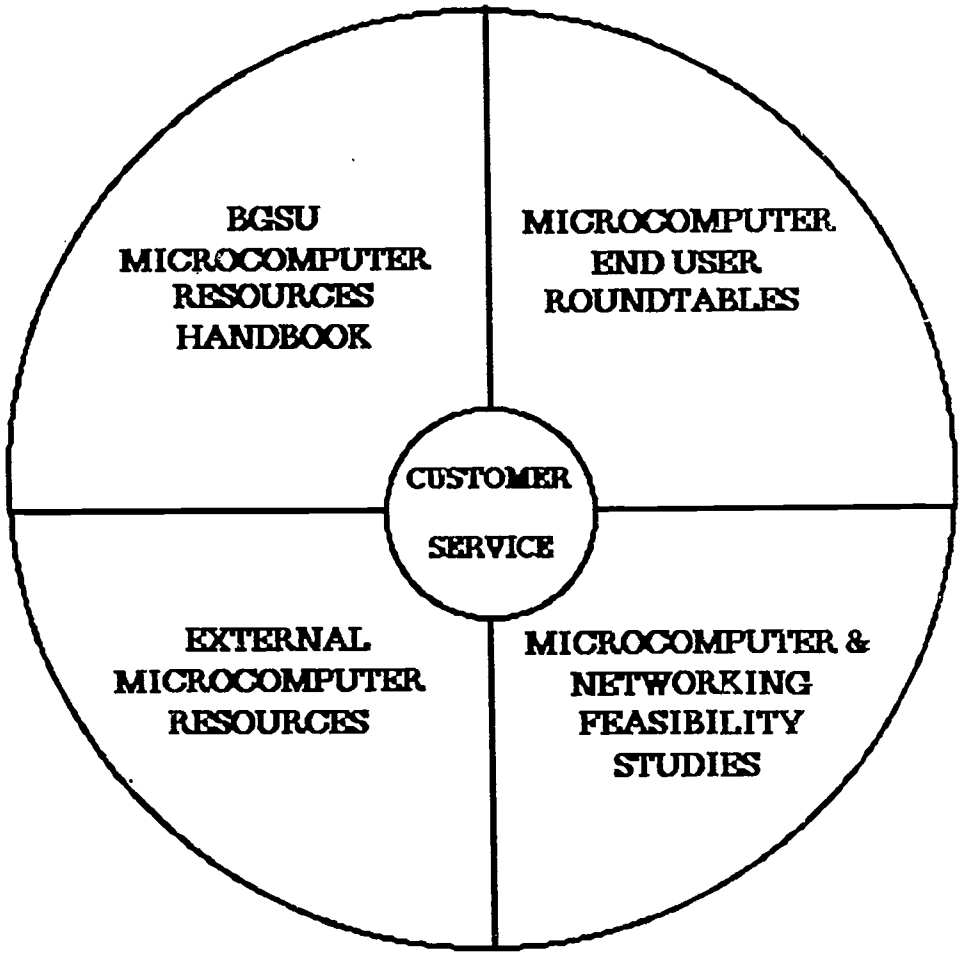
The wealth of microcomputer knowledge at many institutions is tremendous, and organizational and personnel strategies can be established to "tap" the existing resources. Such a cost effective approach allows the development of microcomputer end user services without the addition of major staffing commitments.

## Developing a Circle of Services for Microcomputer End Users: A Cost Effective Approach

### Introduction

The Circle of Services for Microcomputer End Users at Bowling Green State University consists of the following four quadrants: 1) BGSU Microcomputer Resources Handbook, 2) Microcomputer End User Roundtables, 3) Microcomputer/Networking Feasibility Studies, and 4) External Microcomputer Resources. Each quadrant is based on a foundation of customer service, and feedback from the user community indicates that the proper foundation has been established.

**DEVELOPING A CIRCLE OF SERVICES FOR MICOROCOMPUTER END USERS**




This paper focuses on the goals associated with each quadrant within the Circle of Services. In addition, procedures for developing each of the service components is presented.

## BGSU Microcomputer Resources Handbook

"I'm sorry, that is not a supported product." How many times have centralized microcomputer support personnel made that statement to end users needing assistance? At Bowling Green State University, that response is changing.

Today, the request for help for non-supported microcomputer hardware and software generates the following reply: "Even though that product is not supported, we have a directory of 156 on-campus microcomputer resource persons who have volunteered to assist other users."

### Goals

Handbook Goals. The primary goal in the development of the BGSU Microcomputer Resources Handbook was to develop a comprehensive listing of all classified staff, administrative staff and faculty along with their areas of microcomputer hardware and software expertise. Secondary objectives included a desire to maximize limited human microcomputer resources in a university environment and to promote the decentralized concept of users helping users.

### Procedures

Exploring the Unknown. Since this was the first attempt to establish a directory of users' microcomputer knowledge at the University, unknown territory was being explored. The entire project revolved around the user community's willingness to be listed as microcomputer resource persons in an inaugural publication. Whether 1 or 100 people would respond to the Handbook survey could only be determined by giving it the "old college try". The response was tremendous as evidenced by some of the statistics cited later.

Survey Instrument. After going through multiple revisions, a final Handbook survey form was devised. The dual-purpose survey was designed to capture users' knowledge of products centrally supported by University Computer Services as well as non-supported products.

A checklist of supported products comprised the front page of the survey so users could quite easily check those hardware and software products for which they would be willing to be identified as microcomputer resource persons. The back page of the survey contained a few samples of areas of microcomputer expertise for non-supported products along with ample space for filling in the "Type of Microcomputer Expertise" along with a "Description". The survey also requested the user's name, department, and campus phone.

Since the goal of this project was to develop a comprehensive listing of all BGSU personnel and their areas of microcomputer expertise, the survey was sent to all classified staff, administrative staff and faculty. From the diversity of responses, it is apparent that microcomputer expertise resides in all segments of the University community.

The Incredible Response. Thanks to the user community's unbelievable willingness to share their microcomputer hardware and software knowledge, the BGSU Microcomputer Resources Handbook has evolved into a 23 page document consisting of feedback from 156 individuals representing 985 individual entries. Furthermore, a total of 233 hardware and software products are listed in the publication. It should be noted that 23 hardware and software products were supported at that point in time. That is, users volunteered to be microcomputer resource persons for an additional 210 non-supported products!

Putting It Together. With 156 survey forms sitting on my desk, the notion of taking a concept and turning it into reality seemed formidable. A project that was quite unknown in the beginning had been transformed into a potential tremendous resource for the institution. Now, the task of getting all the data into a user-friendly format had to be tackled.

With a trusty word processor, extensive use of copy and paste, and phone calls to users to determine appropriate categorization of certain products, the formidable task became manageable. Each respondent's survey was entered on a product by product basis into a two column format that evolved into the body of the Handbook.

In an attempt to make the document user-friendly, both a table of contents and an index were included. If an individual wants to identify a resource person who has worked with certain types of printers or specific kinds of spreadsheets, the table of contents provides an easy reference. The index is an alphabetical listing of product names contained in the Handbook. If one is seeking a resource person for a particular hardware of software product, the index serves as a quick reference.

Striving to minimize costs, all copies were completed in-house. Furthermore, an inexpensive plastic backbone was used as opposed to binding. With the foregoing cost-cutting measures, the paper costs, cover development, and "binding" totaled 30 cents per copy!

Distribution. Once the publication was finalized, distribution became the next task. The intent was to provide wide enough distribution to promote the use of the publication without sending duplicate copies to individuals or areas. A database consisting of all academic departments, administrative offices, the 156 microcomputer resource persons who volunteered to be in the Handbook, selected University Computer Services personnel, attendees of monthly Microcomputer End User Roundtable meetings, the President, Vice Presidents, Deans, Planning and Budgeting Directors, Chair of the Faculty Senate, and members of University Computing Council was formed. Each person in the database received a cover letter from Dr. Richard Conrad, Director of University Computer Services and Telecommunication Services, along with a complimentary copy of the Handbook. A total of 408 Handbooks were distributed throughout the University community.

Publicity Campaign. As with the compilation of any handbook, the ultimate value of the publication is determined by its use. In an effort to promote the use of the

document, a small publicity campaign was developed. A feature article on the goals of the BGSU Microcomputer Resources Handbook was run in the Monitor - the campus faculty and staff weekly newspaper. The University Computer Services Bulletin also included an article on the development of the Handbook.

Furthermore, the Handbook was promoted at the following campus groups: 1) Microcomputer End User Roundtables, 2) University Computing Council, 3) Faculty Senate, 4) Administrative Staff Council, and 5) Classified Staff Council. The publicity campaign not only enhanced the use of the Handbook in the user community but also fostered the services image of Computer Services.

Campus Reaction. The reaction to the inaugural publication of the BGSU Microcomputer Resources Handbook has been quite positive. Numerous requests for additional copies have been received, and users have characterized the Handbook as extremely helpful. The old statement: "I'm sorry, that is not a supported product" is on the way out at BGSU, because a publication that maximizes limited microcomputer human resources has evolved from a concept into reality.

Handbook Conclusion. When trying something new, the outcome is always in doubt. In this case, questions about "Will we get enough responses?", "Should we focus our efforts on a few, centrally supported products?", and "Will the Handbook actually be used?" have been answered. As Carole Barone said in the Fall 1988 issue of CAUSE/EFFECT:

> Balance of central versus distributed functions with access to centrally provided support will furnish the most responsive computing environment when it is founded on carefully considered, articulated, and understood policy, goals, and procedures.

The cost effective approach taken at Bowling Green State University will work not only at institutions of higher education but also at any site where personnel are willing to share their knowledge of microcomputer hardware and software.

## Microcomputer End User Roundtables

Is there a way to develop an informal setting to foster person to person communications among microcomputer end users and provide general information of common interest? The answer to this question became the basis for the establishment of Microcomputer End User Roundtables at BGSU.

### Goals

Roundtable Goals. The following three customer service oriented goals have been achieved via the Roundtable concept: 1) obtain answers to questions on selected "Spotlight Topics", 2) share ideas regarding microcomputer "happenings" on campus, and 3) get to know other microcomputer users.

## Procedures

Getting Started. To determine the degree of interest in the microcomputer user community for the concept of Microcomputer End User Roundtables, the first step was getting the word out about the first organizational meeting. By means of a mailing to budget administrators, an article in the Monitor, and an announcement in the University Computer Services Bulletin, a nucleus of 20 individuals representing 18 different offices attended the first meeting.

Initial Meeting. The first meeting of the Roundtable was essentially a brainstorming session where microcomputer users were given the opportunity to generate a variety of topics as possible "Spotlight Topics" for future Roundtables. In addition, participants at the initial meeting offered suggestions regarding the structure including frequency and length of Roundtable meetings.

A Typical Roundtable. From the outset, microcomputer users provided input on how the Roundtable would evolve and what topics were of interest. Today, a typical Roundtable has three basic components. First, time is taken for each person attending to introduce themselves and the office they represent. This approach is directly related to the original goal of giving microcomputer users the opportunity to know other users on campus.

Second, the "heart" of each Roundtable is a "Spotlight Topic" in which an informal panel of on-campus resource persons (many times identified from the BGSU Microcomputer Resources Handbook) presents general information on the topic for that particular day.

Third, time is reserved near the end of each meeting for the "Good of the Order". This gives anyone attending the opportunity to share microcomputer "happenings" that might be taking place on campus or simply share some microcomputer experience in his/her office setting that might be helpful to others.

Channels of Communication. In an effort to keep the channels of communication open and to expand participation to other persons and offices, "Summary Notes" are distributed after each meeting to everyone on the Roundtable database. Also, each upcoming meeting is promoted via an article in the Monitor and by a direct mailing, with a flyer for posting, to individuals on the database.

Spotlight Topics Presented. Since the Roundtables are only held during the academic year, the following list indicates the Spotlight Topics covered to date.

Software Selection
Networking
Desktop Publishing
Viruses
Academic Year-End Review
Hardware - Top 10 Troubleshooting Tips
Software Seminars, Classes, and Other Training Opportunities
Ergonomics - The Science of Adapting the Working Environment to the Worker

Roundtable Statistics. Currently, seven monthly meetings are held during the academic year. From the first meeting of 20 participants, the Roundtable database has grown to 102 individuals from 62 different offices on campus. Average attendance so far this year has been 32 per meeting.

Roundtable Conclusion. Users not only determine the content of the various "Spotlight Topics", but also benefit from the exchange of information that occurs at the monthly meetings. User needs are being met in a decentralized customer service oriented manner. Furthermore, with the use of on campus resources, the Microcomputer End User Roundtables are essentially a "cost free" proposition.

## Microcomputer and Networking Feasibility Studies

At Bowling Green State University, there is tremendous variety among offices in terms of microcomputer and networking equipment and expertise. At one end of the continuum are those few small offices that are just getting microcomputers. At the other end of the continuum are a few offices with quite sophisticated equipment that are transferring electronic data to various locations via InterNet. Between these two extremes are many offices that are at different points along the continuum.

Recognizing the degree of microcomputer and networking diversity at the institution, the task of providing assistance to areas desiring microcomputer and networking feasibility studies is quite formidable.

## Goals

Micro/Network Feasibility Study Goals. For those offices requesting a microcomputer feasibility study, the primary goal is to help personnel in the office make informed decisions regarding computerization. For areas seeking a networking feasibility study, the main objective is to provide assistance so logical networking decisions within the campus framework can be made.

## Procedures

Getting the Word Out. Since microcomputer and networking feasibility studies were a new service offered by Computer Services for the first time in May of 1989, one of the first tasks was to let the campus community know that such services were available. Announcements at Microcomputer End User Roundtables, an article in the University Computer Services Bulletin, and word of mouth was more than sufficient to inform users of the new service.

Microcomputer Needs Assessment Instrument. Assessing the needs of an office is the first step to assist those areas requesting a microcomputer feasibility study. In an attempt to provide comprehensive service and gather all the necessary data for the study, a Microcomputer Needs Assessment Instrument was devised. A total of 30 data gathering questions are asked in the following categories.

Statement of Objectives

Analyzing Information Requirements
Software Considerations
Hardware Considerations
Human Resources
Cost/Benefit Analysis

After answers to the various questions have been obtained, research is then conducted using resources within Computer Services as well as other resources on campus and off campus when needed.

Microcomputer Feasibility Study Report. The culmination of the data gathering and research is the final written report to the office initiating the request. Although the specific information provided varies substantially from one office to the next, the Microcomputer Feasibility Study Report contains the following general headings.

Defining the Needs
Primary Need 1, 2, Etc. Including Costs
Secondary Need 1, 2, Etc. Including Costs
Application Software
Hardware Options
Microcomputer Changes
Computer Services Contacts

Networking Needs Assessment Instrument. For areas considering networking, the current hardware and software environments as well as the potential uses of a network must be ascertained. In order to determine pertinent information, a Networking Needs Assessment Instrument was developed. Thirty-two specific questions in the following categories are asked to appropriate personnel to gather the necessary information.

Statement of Objectives
Analyzing Communication Requirements
Software Resources
Hardware Resources
Human Resources
File Server Options
Network Layout

Upon completion of the Networking Needs Assessment Instrument, various internal and external resources are used to prepare a final Networking Feasibility Study Report.

Networking Feasibility Study Report. Although the networking needs and solutions vary from one office to another, the basic ingredients of the Networking Feasibility Study Report consist of the areas identified below.

Defining the Needs
Primary Need 1, 2, Etc. Including Costs
Secondary Need 1, 2, Etc. Including Costs
Software Considerations

Hardware Considerations
Networking Layout Diagram
Networking Changes
Computer Services Contacts

Microcomputer and Networking Feasibility Study Statistics. The first year Microcomputer and Networking Feasibility Studies were offered as a service to offices on campus. 28 areas made requests and ultimately received reports. Of these studies, 13 were classified as microcomputer studies and 15 were networking studies. Of the 12 studies completed at this point in time in the fiscal year, 10 have been networking studies and only 2 have been microcomputer studies. The trend at BGSU is definitely toward networking.

Micro/Network Feasibility Study Conclusion. The implementation of Microcomputer and Networking Feasibility Studies has broadened the customer services philosophy of University Computer Services. Users have provided positive feedback about the time taken to "truly understand" their microcomputer and networking needs. An indirect spinoff benefit has been the opening of communication channels allowing users to better understand the benefits associated with the most popular local area network on campus.

## External Microcomputer Resources

This is the only component of the Circle of Services for Microcomputer End Users that is still evolving. The intent is to take existing publications obtained by Computer Services and make them available to offices that cannot justify the costs.

### Goals

External Microcomputer Resources Goals. The primary goals in making External Microcomputer Resources available to end users are to develop a microcomputer library of selected publications and to serve users by providing information from Datasources.

### Procedures

Developing the Microcomputer Library. Various personnel in Computer Services receive numerous free, and some paid, subscriptions to many different publications. Historically, the magazines and journals were routed to selected personnel within Computer Services and ultimately sent to the Science Library for shelving or destruction. Today, selected publications are routinely categorized and housed in the Administrative User Services office. At no cost, a resource is being developed for end users.

Informing the User Community. Now that twelve months of various publications have been collected, some standard methods will be used to inform end users about the existence of the Microcomputer Library. Announcements at

Microcomputer End User Roundtables, a mailing to the Roundtable database, a statement in the Monitor, and an article in the University Computer Services Bulletin will be utilized to get the word out.

Selecting Publications. Since there was a human resources limit as to the number and volume of publications to be retained for possible reference by the user community, there was an arbitrary decision to keep only a limited number of magazines and journals for a limited amount of time.

Since Computer Services centrally supports IBM and MAC products and since Microcomputer and Networking Feasibility Studies had identified the types of needs in many offices, publications were chosen in the following categories: 1) General, 2) IBM-Oriented, 3) MAC-Oriented, 4) Networking, and 5) Office-Oriented.

The following 17 publications are retained in the Microcomputer Library. General magazines and journals include Computerworld, Datamation, Information Week, Infoworld, and MIS Week. IBM-oriented publications are PC Magazine and PC Week. MAC-oriented resources are MacWeek and MacWorld. Networking items include Communications Week, Connect, LAN, Network World, and Networking Management. Office-oriented publications are Modern Office Technology, The Office, and Today's Office.

Datasources as a Resource. Datasources is a comprehensive guide to available data processing and data communications hardware, software, and companies. Computer Services had subscribed to Datasources for some time using it primarily for internal purposes. It became an invaluable personal resource tool while compiling the first BGSU Microcomputer Resources Handbook.

The intent is to provide the following types of information when users have specific needs that cannot be met by internal campus resources: 1) brief product descriptions, 2) configuration requirements, and 3) 800 phone numbers for possible contacts. Thus, an existing resource will ultimately serve as an aid for end users with specific needs.

External Microcomputer Resources Conclusion. Although the External Microcomputer Resources quadrant of the Circle of Services is still evolving, the Microcomputer Library and the expanded use of Datasources will hopefully enhance services provided to the end user community.

**Project Accounting Related to the Four Quadrants of the Circle of Services**

What time and effort is being devoted to the user community in terms of the four quadrants contained within the Circle of Services? In an attempt to provide the Director of University Computer Services and Telecommunication Services an answer to this question, a monthly report format was developed.

**Goals**
9

Project Accounting Goals. Two goals were articulated during the development of the project accounting procedure. First, all project activities associated with any of the four quadrants should be contained in the monthly report. Second, a "user-friendly" standardized synopsis of the amount of effort devoted to various tasks should be included.

## Procedures

Supporting Documentation. In order to track the necessary information to summarize in the monthly report, three documentation techniques are used. First, a daily log is maintained that categorizes the type of activity, identifies the amount of time devoted to a task, and contains a brief description of the activity. Second, a monthly project list is derived from the daily logs. Third, a spreadsheet reflecting the hours spent in each category is kept.

Monthly Report. Using the three documentation techniques as sources of information, the monthly report is prepared for the Director of University Computer Services and Telecommunication Services. Descriptive information, as well as a pie chart showing the percentage of time spent in each category, is summarized. The report categories include:

Hardware
Software
Office Projects ( Micro & Network Feasibility Studies)
External Microcomputer Resources
BGSU Microcomputer Resources Handbook
Microcomputer End User Roundtables
Meetings
General Reading
Miscellaneous

Project Accounting Conclusion. The monthly report not only serves as a project accounting mechanism but also as a method for informing higher level administration about the level of customer service support being provided to end users.

## Summary

How can support be expanded to microcomputer end users without major expenditures? Can informal settings be developed to foster person to person communications among microcomputer users? Is it possible to serve diverse offices attempting to meet their microcomputer and networking needs? Can existing centralized publications and other resources be organized for utilization by end users? At Bowling Green State University, the Circle of Services that is based upon a foundation of customer service results in affirmative responses to each of the above questions.

Bowling Green is not unique in terms of human resources. Many colleges and universities have a wealth of microcomputer human resources waiting to be "tapped". Developing appropriate organizational and personnel strategies based upon sound goals and procedures can result in maximizing the potential of those resources in a cost effective manner.